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ROYAL BOTANIC GARDENS, KEW

LII—THE VEGETATION OF SCHOEMANSKLOOF, EASTERN TRANSVAAL. J. C. Smuts.

We have much pleasure in publishing in the "Kew Bulletin" an article by the Right Honourable J. C. Smuts, F.R.S., whose interest in botany is well known. The paper is printed as written by the author except that a few of the names given in the field have been revised after comparison in the Herbarium.

The discovery by General Smuts of five* new species of flowering plants during so brief a visit to the Eastern Transvaal shows how valuable may be such botanical excursions into the less-known parts of Southern Africa.

A set of the specimens has been presented to Kew. A. W. H.

Schoemanskloof.

I was in the Kloof from 7th to 12th June 1932, and collected at various spots to be mentioned later. The Kloof is just below the highveld on the Machadodorp-Lydenburg road, and while itself fairly deep rises in steep slopes to the Drakensberg all around, and thus gives scope for a variety of altitudes and plant forms. Everywhere ancient terraces on the hillsides point to an ancient Bantu or even pre-Bantu people having densely occupied the valley. In fact these terraces followed me all the way in all the Drakensberg valleys and hill-slopes I examined. Four plants were in flower everywhere and gave a pleasant appearance to the otherwise winter aspect: *Iboza riparia, Sutera grandiflora,* a broad-leaved *Athrixia, A. phylicoides* (see p. 425) and a tall large-leaved *Vernonia, V. podocoma* (see p. 425). To these have to be added the Aloes mentioned below.

The first locality where I collected was about 4 or 5 miles down the valley at the trading store on Somerset. Here the soil was red turf, from decomposed diabase, and in a rainstorm which occurred the soil became a badly clinging clay. The stream-banks were covered with *Combretum erythrophyllum* and *Eugenia cordata,* while just beyond was tall grass with much *Acacia caffra* and occasional *Peltophorum africanum* interspersed. A little higher on the hill-slopes were almost pure stands of *Aloe Marlothii* with occasional *Pterocarpus angolensis.* Tall *Ficus* (2) and *Eugenia cordata* were also found growing isolated on the dry hill-sides.

In the gorges rising out of the valley were growing *Ficus, Pyrenacantha, Royena lucida,* a *Euclea, Myrsine africana, Ximenia*

* Including *Helichrysum Summomontanum* Verdoorn in Flowering Plants of South Africa, pl. 483 (1933).

americana, Rhamnus prinoides and *R. Zeyheri, Chrysophyllum magalismontanum* (but no *Mimusops*), *Zizyphus mucronata, Sclerocarya caffra,* and scattered *Bauhinia punctata* (see p. 422) in the tall grass, with two species of *Mucuna.* I saw on the open slopes a good deal of *Dicoma Zeyheri* and *D. anomala, Geigeria Burkei* and other Composites. I saw four Aloes, *A. Marlothii* and *A. arborescens,* one form with long greenish spike of small flowers, and a common low-growing one with large panicles. Two Cussonias were also seen—one green with mostly entire leaves, the other glaucous with deeply lobed leaves.

My next collecting place was three miles further down the valley where the road crosses the drift near sharp cliffs. Here the forms were more subtropical (alt. from 4000 to 4400 ft.) and the dominant trees were *Bauhinia, Eugenia, Pterocarpus,* while on the dry slopes *Acacia caffra* was still very common. A tall *Ficus* with white grey stem was also common. In the bush which grows up the escarpment the dominant tree was *Maesa rufescens.* I also saw *Pittosporum viridiflorum, Chrysophyllum,* several Combretums, again the two Cussonias, and several *Euphorbia ingens* trees, particularly tall and large. Also *Clerodendron glabrum* (very common), *Gardenia, Vangueria infausta,* etc. I saw *Sphedamnocarpus* sp. near *S. pruriens* in the bushes, and the usual grasses, *Andropogon, Cymbopogon, Trichopteryx, Setaria, Triraphis, Erianthus,* etc. A tall (3 or 4 ft.) *Argyrolobium* with large leaves was very common (without flowers). On the escarpment I found a very small *Mesembryanthemum* new to me, but I fear it has been lost from my collection.

A gorge about a mile further on was full of interesting forms which would be well worth exploring in summer. Here I saw *Celtis, Pittosporum, Bowkeria, Ficus* and *Eugenia, Acacia pennata,* etc. The red cliffs were covered with white *Ficus* and *Euphorbia ingens* and *Chrysophyllum,* while the top of the escarpment was green with *Aloe Marlothii, Acacia* and *Sclerocarya.* So far a rich diabase soil was found.

At my next stop at Sterkspruit (N. of Bos'shop) the soil was sandstone and the altitude had fallen to 3,300 ft. By the road, besides *Bauhinia* and *Eugenia,* I now found a large-leaved *Faurea* which continued all the way into the low veld ; also a large-leaved *Combretum.* A little higher up the slope I found *Chrysophyllum* (*C. magalismontanum*) dominant interspersed with *Pterocarpus angolensis, Aloe Marlothii,* several species of *Rhus* (*R. pyroides* and *R. Rogersii*), a light-coloured Acacia with double spikes and long pods, another with maroon pods, a pretty red Labiate in the undergrowth, again the two Cussonias, *Ximenia americana, Dombeya, Gymnosporia buxifolia, Sclerocarya* and *Clerodendron glabrum* in plenty. Hillsides continued terraced out very elaborately. A *Combretum* with a silvery leaf was found ; a xerophytic *Ficus* grew all the way up ; and on top a grass plateau.

At Sterkspruit the Schoemans valley debouches into the valley of the Crocodile River. Here the scenery was most magnificent—a

jumble of great mountains and deep river valleys and gorges. I crossed the Crocodile over the bridge at the Indian store and then passed up the valley on the other side and camped at the foot of the highest mountain in that vicinity (Erasmus farm on Rietvlei). I climbed the mountain (5300 ft. by the aneroid), and saw two Proteas on top, one with a small leaf, *P. abyssinica*, and another with much larger leaf, like the Cape *P. grandiflora*. The farmers told me there were two distinct forms.

At 5000 ft. I skirted a forest, where I collected *Rapanea melanophloeos*, *Curtisia faginea*, *Cephalanthus natalensis*, *Burchellia capensis*, *Lachnopylis*, etc. On top of the mountain was a pure *Trichopteryx* association, a little lower mixed with *Monocymbiums*, and still lower —at about 4000 ft.—*Themeda triandra*. Lower still were *Acacia* (much *A. giraffae*), *Eugenia*, and *Pterocarpus*.

Passing from the Houtbosloop river, which flows to Alkmaar Station, I collected at Rivulets, where I found the hill-slopes covered with tall grass and *Pterocarpus*, and the river banks with *Adina Galpinii* in beautiful high straight-growing trees; on the rocky slopes *Euphorbia ingens*, *Chrysophyllum*, etc. This type of vegetation continues all the way to Alkmaar. Here the red turf gives way to a poor granite soil which continues to White River and Rosehaugh. I camped on a donga near Rosehaugh and collected *Cyathea Dregei*, *Pittosporum viridiflorum* (see p. 421), *Maesa rufescens*, *Eugenia*, *Erica drakensbergensis*, *Bowkeria cymosa*, *Pterocarpus* and *Ficus*; *Cussonia* and *Cephalanthus natalensis* were both very common, also *Royena* and *Euclea*.

Passing on to Sabie and Graskop my next collection was made at the causeway on the river just before Bushbuckridge, where the Low-veld at about 2000 feet is reached. Below the Konyns Pass, I found first about 10 miles of grass veld with scattered tree forms; then a *Parinari mobola** formation was entered into, with other tree-forms, continued all the way to Acornhoek. Besides *Parinari* I noticed here *Sclerocarya*, *Terminalia sericea*, an Acacia with much-curled pods, *Acacia giraffae*, *Trichilia emetica*, *Maesa rufescens*, a large-leaved *Bauhinia* (*reticulata*?) and *Erythrina caffra*.

Coming back to the Sabie I went up the valley which leads to Mount Anderson. In this valley I saw again the *Pyrenacantha*, with small flowers, *Maesa*, *Cephalanthus*, *Rhus*, *Eugenia* and *Gymnosporia*. I had no time for a fuller examination. Going up the pass I found a mixed grass veld on top, 7000 ft. I climbed Mt. Anderson (aneroid 7300 ft.) and saw two Helichrysums, one canescent, the other an arborescent form or bush several feet in diameter, *Erica arborea* in plenty, and several other species of plants which I have not pressed. The same night at 10.15 I reached Irene.

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* This is probably the same *Parinari* of which I saw many specimens in the Eastern Zoutpansberg in 1930, and which I found to be *P. curatellifolia* Planch. (see *K.B.* 1931, 243).—J. H.

List of plants collected by General J. C. Smuts at Schoemanskloof, Eastern Transvaal, except where otherwise indicated.

The complete list of plants actually collected by General Smuts is given here, which, together with those mentioned in his paper, may prove useful to other botanists visiting this region about the same season of the year. Although the General spent only a few days collecting, he has brought to light some new species and some not previously recorded from the Transvaal. It is very probable that an intensive survey of the mountains and valleys of the Eastern Transvaal during the flowering and fruiting season would yield much of very great interest, for they seem to carry a flora which is not quite tropical and not typically Cape, but a little of both, with a considerable endemic element. The plant associations, therefore, must be of very great interest. And whilst we have a fair idea of the latitudinal range of the species on these mountains and on the eastern escarpment of the great African plateau, we know very little of their altitudinal range.

The collection was named tentatively at the National Herbarium, Pretoria, and nearly all have been verified at Kew with authentic or type specimens. I have added here and there a few notes on distribution gleaned whilst comparing the plants. J.H.

POLYPODIACEAE: **Cheilanthes multifida** *Sw.*; no. 38B, from Mt. Anderson. **Cyathea Dregei** *Kunze*; no. 86. **Polystichum Macleaii** (*Bak.*) *Diels*; no. 38, from Mt. Anderson. **Pteridium aquilinum** (*Linn.*) *Kuhn*; no. 86A.

SCHIZAEACEAE: **Mohria caffrorum** *Desv.*; no. 1; no. 38A, from Mt. Anderson.

CYCADACEAE: **Encephalartos lanatus** *Stapf et B. Davy*; no. 285. —only found in the Eastern Transvaal, from Middelburg through the Godwan River districts to Barberton.

RANUNCULACEAE: **Clematis brachiata** *Thunb.*; no. 282.

POLYGALACEAE: **Polygala virgata** *Thunb.*; nos. 88; 272.

CRASSULACEAE: **Crassula retrorsa** *Hutch.* n. sp.;* no. 48, Mt. Anderson. **C. parvisepala** *Schonl.*; no. 269A.—A shrubby species 2–3 ft. high, with sweet scented, white flowers; confined to the

*__Crassula retrorsa__ *Hutch.* sp. nov.; affinis *C. abyssinicae* var. *transvaalensi* Schonl., sed foliis brevioribus infra reflexim setuloso-papillosis differt.

Herba 15–20 cm. alta, erecta; caulis laxe foliatus, pilis strigillosis albidis deflexis indutus. *Folia* anguste oblongo-lanceolata, basin versus connata, 2–3 cm. longa, usque ad 1 cm. lata, supra glabra, infra setulis deflexis laxe induta, marginibus dense papilloso-ciliolatis. *Cymae* densiflorae, circiter 3 cm. diametro; bracteae lanceolatae, papilloso-ciliatae; pedicelli usque ad 5 mm. longi, glabri. *Sepala* anguste triangulari-lanceolata, apiculato-acuminata, 2·5 mm. longa, glabra. *Petala* oblonga, acuta, 4 mm. longa, 1·25 mm. lata, glabra. *Stamina* petalis breviora. *Carpella* 5, longe apiculata.

Eastern Transvaal: Mt. Anderson, *Smuts* 48 (type).

mountains of the Eastern Transvaal, and collected in the same locality by *Wilms* (no. 516) in 1888. **Kalanchoe rotundifolia** *Harv.* ; no. 25.

PHYTOLACCACEAE : **Phytolacca stricta** *Hoffm.* ; no. 68.

THYMELAEACEAE : **Lasiosiphon capitatus** (*L.f.*) *B. Davy* ; no. 257. **Passerina montana** *Thoday* ; no. 91, from Rosehaugh.

PROTEACEAE : **Faurea speciosa** *Welw.* ; no. 52.—This fine species ranges through the dry forest area of the plateau region to Angola and northwards through Rhodesia and East Africa, also occurring on the interesting remnant of the plateau in Northern Nigeria, the Bauchi plateau. **Protea abyssinica** *Willd.* ; no. 277 ; and no 97A, from Rietvlei.—Extends to Angola and N. W. Rhodesia, through the East African Mountains to Abyssinia.

PITTOSPORACEAE : **Pittosporum viridiflorum** *Sims* ; no. 291.—This has a very wide distribution ; it occurs in Angola and Eastern Rhodesia, and follows the forest patches from the Central Zoutpansberg and through the eastern districts to Knysna ; it is recorded also from the hills around Pretoria. The attractive shiny seeds are probably distributed by birds.

OCHNACEAE : **Ochna natalitia** *Engl.* ; no. 334.

MELASTOMACEAE : **Dissotis incana** *Triana* ; no. 313.

COMBRETACEAE : **Combretum gazense** *Swynn. et Bak. f.* ; no. 56. —This extends the distribution of the species considerably southward, the nearest point hitherto having been Wylie's Poort in the Central Zoutpansberg ; thence it is found northwards as far as the Katanga. **C. holosericeum** *Sond.* ; no. 57 ; no. 71, from Rosehaugh.

HYPERICACEAE : **Hypericum aethiopicum** *Thunb.* ; no. 29, from Rietvlei, Crocodile River.

STERCULIACEAE : **Dombeya pulchra** *N. E. Br.* ; no. 263.—Confined to this part of the Eastern Transvaal. **Hermannia montana** *N. E. Br.* ; no. 28, from Rietvlei, Crocodile River.

MALVACEAE : **Hibiscus trionum** *Linn.* ; no. 94.

MALPIGHIACEAE : **Sphedamnocarpus** sp., allied to *S. pruriens Planch.* ; no. 298.—The specimen is in fruit and I have not been able to determine it satisfactorily ; possibly an undescribed species.

EUPHORBIACEAE : **Jatropha latifolia** *Pax* ; no. 90, from Rosehaugh.

GREYIACEAE : **Greyia Radlkoferi** *Szyszl.* ; no. 268.

ESCALLONIACEAE ; **Choristylis rhamnoides** *Haw.* ; no. 288.—An interesting genus of two species endemic to the montane region

of Eastern Africa ; when out of flower much resembling *Rhamnaceae*. *C. rhamnoides* ranges from the woods of the Katberg through Natal as far north as Houtbosh (Woodbush). Then apparently there is a gap, and from the Melsetter district of Eastern Rhodesia, the second species, *C. shirensis* Bak. f., takes its place, extending northwards as far as the Kinga Mts. in Southern Tanganyika.

ROSACEAE : **Cliffortia linearifolia** *Eckl. et Zeyh.* ; no. 42, from Mt. Anderson.

CAESALPINIACEAE : **Bauhinia punctata** *Bolle* (*B. Galpinii* N. E. Br.) ; no. 307.—Unfortunately this plant has to bear the older name given by Bolle ; this is regrettable after it has become so well known to Transvaal botanists under the name given to it by N. E. Brown.

MIMOSACEAE : **Acacia ataxacantha** *DC.* ; nos. 51 ; 271. **A. campylacantha** *Hochst.* ; no. 262. **A. karroo** *Hayne* ; no. 62. **A. Woodii** *Burtt Davy* ; nos. 306 ; 325. **Dichrostachys glomerata** (*Forsk.*) *Chiov.* ; no. 65, from Rietvlei, Crocodile River.

PAPILIONACEAE : **Dalbergia armata** *E. Mey.* ; no. 256. **Pterocarpus angolensis** *DC.* ; no. 259. **Mundulea suberosa** *Benth.* ; no. 55A. **Indigofera Garckeana** *Vatke* ; no. 92.—A new record from the Transvaal ; hitherto known only from Rhodesia northwards to the Nile districts. **I. perplexa** *N. E. Br.* ; no. 302.—A very rare and little known species. **Rhynchosia komatiensis** *Harms* ; no. 37. **Flemingia Grahamiana** *W. et A.* ; nos. 12 and 36.—This is a most interesting species with a remarkably wide distribution. It follows the plateau and lower parts of the mountains from the north eastern Transvaal through north western Rhodesia to the Shari, and East Africa generally ; it has been found in Arabia, at 6000 ft., about 50 miles north of Aden, and reappears in Southern India ; and the French Missionaries have collected it as far away as Tapintze in Yunnan, Western China. This wide distribution is rather remarkable for such a distinct looking species. It contains a yellow dye, which spreads over the mounted sheet after poisoning. **Pseudarthria Hookeri** *W. et A.* ; no. 301. **Eriosema psoraleoides** *Don* ; no. 67, from Rosehaugh.—Up to a few years ago this common and widely spread species was known as *E. cajanoides* Benth., but the older specific name has now to be used under international rules. **Erythrina lysistemon** *Hutch.*, new sp. ;* no. 66, from Rietvlei, Crocodile River.—A critical

* **Erythrina lysistemon** *Hutch.* sp. nov. ; affinis *E. caffrae* Thunb., sed forma foliorum, vexillo angustiore, stamino vexillare libero differt.

Arbor parva, usque ad 7 m. alta ; ramuli aculeis brevibus armati. *Folia* post anthesin producta ; foliola ambitu rhomboidea, basi latissime cuneata, superne longe et late acuminata, lobis lateralibus a costa angulo recto patentibus oblongo-rotundatis, usque ad 10 cm. longa et 8 cm. lata, utrinque glabra, basi conspicue trinervia ; petioli circiter 5 mm. longi, basi glandula carnosa instructi. *Racemi* longe pedunculati, pedunculis et axi inflorescentiae plus minusve tomentosis ; pedicelli brevissimi. *Flores* reflexi, rubri.

examination of General Smuts' plant has shown that the specimens from the Transvaal previously referred to *E. caffra* Thunb. represent a distinct species. Superficially the two species are very much alike, but I was induced to investigate further on account of the small and narrower vexillum and the peculiar shape of the leaflets of the Transvaal plant. That these were of importance was revealed on dissection, for in the new species the vexillary stamen was found to be quite free from the split staminal tube, whilst in *E. caffra* it is adnate to it below the middle. *E. caffra* is thus shown to occupy an area in Southern Africa from Uitenhage through the hills of the lower coastal belt east of the Drakensberg escarpment to Eastern Rhodesia. Mr. Jan Gillett and I also collected this new species in July 1930, in the Zoutpansberg, on low hill sides, where we found several trees in the bare grassy veld about nine miles east of Louis Trichardt, alt. 3000 ft. I remember these trees very well, for they caught our attention fully a mile away with their scarlet flowers, much visited by bees, and almost leafless at the time of flowering (*Hutch. et Gillett* no. 4155). —J. H. **Pearsonia propinqua** *Dummer*; nos. 95; 293.—Another very rare species. **Argyrolobium** sp. nov.? near *A. Wilmsii* Harms; a very distinct species of which further material is desired; grows socially, and up to 3 ft. high; no flowers collected; no. 327.

MYRICACEAE: **Myrica conifera** *Burm. f.*; no. 96, from Bushbuckridge river.

MORACEAE: **Ficus ingens** *Miq.*; no. 295. **F. Sonderi** *Miq.*; no. 82.

AQUIFOLIACEAE: **Ilex mitis** (*Linn.*) *Radlk.*; no. 69.

CELASTRACEAE: **Cassinopsis ilicifolia** *O. Kuntze* (*O. capensis* Sond.); nos. 252; 329; 331.—Widely spread in South Africa, from the Cape district to Swaziland. **Pterocelastrus Galpinii** *Loes.*; nos. 22 and 99, from Rietvlei.—Only one specimen at Kew and that in fruit; described originally from Rimer's Creek, Barberton.

ICACINACEAE: **Apodytes dimidiata** *E. Mey.*; no. 274.—Extends through East Africa to Eritrea and southwards through the Knysna forest to the Cape.

Calyx bilabiatus, 1·3 cm. longus, fere ad medium divisus, extra laxe pubescens. *Vexillum* oblanceolatum, circiter 5 cm. longum et 2·5 cm. latum, multistriatum. *Alae* leviter oblique oblongae, late et brevissime unguiculatae circiter 1·3 cm. longae et 4 mm. latae. *Petala* carinae late elliptica, circiter 1 cm. longa. *Stamem* vexillare ad basin liber; antherae 3·5 mm. longae. *Ovarium* longe stipitatum, appresse tomentellum, multiovulatum, stylo glabro. *Fructus* [incompletus] stipitatus, fere glaber, ut videtur moniliformis.

Eastern Transvaal: Rietvlei, Crocodile River, June 1932, *Smuts* 66 (type). Macalisberg, Aug., *Burke*. Pretoria district, *Nelson* 84. Rustenburg, *Nation*. Zoutpansberg, 9 miles south-east of Louis Trichardt, 3000 ft., tree 50 ft., flowers scarlet, visited by bees, *Hutchinson et Gillett* 4155.

RHAMNACEAE : **Rhamnus prinoides** *L'Herit.* ; no. 320.—Another very widely spread shrub, reaching Abyssinia and the Cameroons in the north, and south to Cape Province. **R. Zeyheri** *Sond.* ; no. 324.

AMPELIDACEAE : **Rhoicissus digitata** (*L.f.*) *Gilg. et Brandt* ; no. 54A.—South to Riversdale, where it grows in the bush at sea level, and north to Eastern Rhodesia. **R. cuneifolia** (*E. & Z.*) *Planch.* ; no. 275.

SIMARUBACEAE : **Hippobromus pauciflorus** (*L.*) *Radlk.* ; no. 276. —Ranges from Humansdorp through the Eastern districts to the Barberton district.

SAPINDACEAE : **Pappea fulva** *Conrath* ; no. 61.—Very closely allied to the widely spread *P. capensis* Eck. et Zeyh.

ANACARDIACEAE : **Rhus Legatii** *Schonl.* ; no. 55.—Extends southwards to the Zuurberg and Swellendam. **R. Pentheri** *Zahlbr.* ; nos. 296 ; 323. **R. pyroides** *Burch.* ; no. 34, from Rietvlei. **R. Rehmanniana** *Engl.* ; nos. 254 ; 319. **R. Rogersii** *Schonl.* ; no. 292.

CORNACEAE : **Curtisia faginea** *Ait.* ; no. 11, from Rietvlei.—Ranges from Eastern Rhodesia through the eastern mountain forests to Table Mountain.

ARALIACEAE : **Cussonia spicata** *Thunb.* ; no. 289.

ERICACEAE : **Erica drakensbergensis** *Guthrie et Bolus* ; no. 87, from Rosehaugh.

VACCINIACEAE : **Vaccinium exul** *Bolus* ; no. 40, from Mt. Anderson.—Only found in the mountains of the Eastern Transvaal. There are only three species of *Vaccinaceae* in Africa, *V. Stanleyi* Schott on Mt. Ruwenzori and the Virunga Mts., *V. africanum* Britten from Mt. Milanji and the Nyasa Plateau, and that enumerated here. There are in addition a few species on the ancient plateau region of Madagascar.

EBENACEAE : **Euclea** sp. near *E. natalensis* A.DC. ; nos. 297 ; 301A ; in fruit only. **E.** sp. near *E. lanceolata* E. Mey. ; nos. 14 ; 100, from Rietvlei. **Royena lucida** *Linn.* ; no. 321 ; no. 84 ; from Rosehaugh.

SAPOTACEAE : **Chrysophyllum magalismontanum** *Sond.* ; nos. 59 ; 60 ; and no. 70, from Rosehaugh.

MYRSINACEAE : *Myrsine africana* Linn. ; no. 39. **Maesa rufescens** *DC.* ; no. 89, from Rosehaugh ; no. 290. **Rapanea melanophloeos** (*R. Br.*) *Mez* ; no. 23, from Rietvlei ; no. 70A from Rosehaugh.—Ranges from the Zoutpansberg through Natal to the Eastern Cape.

LOGANIACEAE: **Buddleja auriculata** *Benth.* var. **euryifolia** *Prain*; no. 58, from Mt. Anderson; nos. 273; 315. **B. salvifolia** *Lam.*; no. 50, from Mt. Anderson. **Lachnopylis pubescens** (*Sond.*) *C. A. Smith*; no. 9, from Rietvlei. **Lachnopylis floribunda** (*Benth.*) *C. A. Smith*; no. 18, from Rietvlei. **Gomphostigma virgatum** (*L.f.*) *O. Kuntze*; no. 33, from Rietvlei.

RUBIACEAE: **Gardenia globosa** *Hochst.*; no. 73, from Rosehaugh. **G. Rothmannia** *Linn. f.*; no. 97. **Burchellia capensis** *R. Br.*; no. 24, from Rietvlei. **Cephalanthus natalensis** *Oliv.*; no. 21, from Rietvlei.—Extends from Natal to the Melsetter district of Eastern Rhodesia. **Pentanisia variabilis** *Haw.*; no. 31. **Grumilea capensis** *Sond.*; no. 333.

DIPSACACEAE: **Scabiosa Columbaria** *Linn.*; no. 78, from Rosehaugh.

COMPOSITAE: **Vernonia podocoma** *Sch. Bip.*; nos. 280; 316; 317.—A very handsome species up to 10 ft. high with large corymbs of small crowded flower-heads. I saw an abundance of this species by the road through the foothills of the Zoutpansberg in Aug. 1930. It is very widely distributed in tropical Africa, in Angola and Rhodesia, reappearing in the mountains of Abyssinia; so far not recorded from the intervening territory; in S. Africa otherwise only in the Eastern Transvaal and Zululand.—J. H. **V. Kraussii** Sch. Bip.; no. 318. **Aster Bakerianus** *Burtt Davy*; no. 267. **A. Harveyanus** *O. Ktze*; no. 2. **Tarchonanthus Galpinii** *Phillips*; no. 13, from Reitvlei. **Laggera alata** *Sch. Bip.*; no. 314. **Cassinia phylicifolia** (*DC.*) *J. M. Wood*; no. 342. **Helichrysum adenocarpum** *DC.*; no. 43, from Mt. Anderson. **H. Kraussii** *Sch. Bip.*; no. 332. **H. lepidissimum** *S. Moore*; no. 47, from Mt. Anderson. **H. setosum** *Harv.*; no. 56A. **H. splendidum** *Less.*; no. 45, from Mt. Anderson. **H. decorum** *DC.*; no. 19, from Rietvlei; no. 269B. **H. summomontanum** *Verdoorn*; no. 44, from Mt. Anderson; a new species described and figured in the Flowering Plants of South Africa, pl. 483 (1933). **Anisopappus Smutsii** *Hutch.* n. sp.*; no. 17, from Rietvlei. **Athrixia phylicoides** *DC.*

*__Anisopappus Smutsii__ *Hutch.* sp. nov.; affinis *A. Junodii* Hutch., sed foliis inferne leviter cuneatis integris superne parce et remote dentatis infra vix reticulatis capitulis plerumque subsessilibus differt.

Frutex; rami costati, albido-tomentelli, flexuosi. *Folia* discoloria, ovato-lanceolata, basi leviter cuneata, apice triangulari-subacuta, 3·5–5 cm. longa, 1·5–2·5 cm. lata, supra minute puberula, infra molliter albido-tomentosa, basi prominenter trinervia; petioli circiter 1 cm. longi, leviter foliacei-alati. *Capitula* pauca, cymoso-corymbosa, subsessilia. *Involucri bracteae* circiter 5-seriatae, late lanceolatae, acutae, gradatim longiores, usque ad 0·8 cm. longae, inferiores lanato-tomentosae, superiores puberulae apicem versus ciliatae. *Receptaculum* paleaceum, paleis oblongo-linearibus superne ciliatis 7 mm. longis. *Flores radii* circiter 10; corollae tubus gracilis, 3 mm. longus, parce puberulus, limbo oblongo 8 mm. longo apice tridentato. *Flores disci* numerosi; corollae tubus parce puberulus. *Achaenia* 4-costata, parce pubescentia. *Pappus* paleaceus, paleis irregulariter laciniatis.

Eastern Transvaal: Rietvlei, 12 June 1932, *Smuts* 17 (type).

no. 278 ; 335A.—This genus of *Compositae* is richly represented by several species in this part of Africa, and there are two species in the districts around the Cape. It has an interesting austral distribution, being found also in Madagascar and Australia ; in tropical Africa the genus occurs on the eastern plateau as far north as the Southern Sudan and Abyssinica. **Geigeria Burkei** *Harv.* ; no. 344. **Athanasia acerosa** *Harv.* ; no. 85, from Rosehaugh. **Senecio microglossus** *DC.* ; no 253. **Lopholaena disticha** (*N. E. Br.*) *S. Moore* ; no. 305 ; **Dimorphotheca nervosa** *Hutch.* n. sp.* ; no. 16, from Rietvlei.—A very distinct species with the habit rather of an *Osteospermum* than a *Dimorphotheca* ; but the one-seriate involucral bracts determine it to be the latter genus. **Berkheya subulata** *Harv.* ; nos. 20 ; 27, from Rietvlei. **Gazania pygmaea** *Sond.* ; no. 10. **Dicoma Zeyheri** *Sond.* ; no. 326. **Gerbera Jamesonii** *Bolus* ; no. 335, common. **G. discolor** *Sond.* ; no. 26, from Rietvlei.

GENTIANACEAE : **Sebaea Schinziana** *Gilg* ; no. 49, from Mt. Anderson.

CAMPANULACEAE : **Wahlenbergia undulata** *A. DC.* ; no. 283.

SOLANACEAE : **Solanum rigescens** *Jacq.* ; no. 284. **S. aculeastrum** *Dunal* ; no. 32, from Rietvlei.

SCROPHULARIACEAE : **Sutera floribunda** *O. Ktze.* ; no. 7, from Rietvlei. **S. grandiflora** *Hiern* ; nos. 279 ; 300 ; 328. **Halleria lucida** *Linn.* ; no. 260 ; 310 ; 311 ; 312. **Bowkeria cymosa** *MacOwan* ; no 287.

ACANTHACEAE : **Dicliptera clinopodia** *Nees* ; no. 64 ; nos. 80 ; 93, from Rosehaugh. **Phaylopsis parviflora** *Willd.* ; no. 76A, from Rosehaugh. **Hypoestes verticillaris** *R. Br.* ; no. 294.

SELAGINACEAE : **Selago aggregata** *Rolfe* ; nos. 6 ; 15, from Rietvlei. **S. elata** *Rolfe* ; no. 76, from Rosehaugh. **S. Wilmsii** *Rolfe* ; no. 3, from hill near Rietvlei, 5300 ft.

LABIATAE : **Iboza riparia** *N. E. Br.* ; no. 322. **Orthosiphon albiflorus** *N. E. Br.* ; no. 5, from Rietvlei. **Plectranthus purpuratus** *Harv.* ; nos. 72 ; 77, from Rosehaugh. **Pycnostachys**

*__Dimorphotheca nervosa__ *Hutch.* sp. nov. ; lignosa, foliis longitudinaliter nervosis valde distincta.

Suffrutex, ramis vetustioribus persistentibus corrugatis ; ramuli laxe foliati, flavescentes, papillato-scaberuli. *Folia* anguste lanceolata, apice acute pungentia, basi angustata, 2–4 cm. longa, 4–6 mm. lata, prominenter et longitudinaliter nervosa, inter nervos crebre reticulata, laxe papillato-scabridula. *Capitula* terminalia, solitaria, circiter 2·5 cm. diametro ; pedunculi breves, densissime papillati. *Involucri* bracteae 1-seriatae, circiter 8, late lanceolatae, acutae, 6–7 mm. longae, nervosae et papillatae, marginibus membranaceis minute denticulatis. *Flores radii* flavi, circiter 8 ; corollae tubus puberulus ; ligula oblonga, apice tridentata. *Flores disci* brunneo-flavi, numerosi. *Achaenia* matura non visa. *Pappus* nullus.

Eastern Transvaal : Rietvlei, June 1932, *Smuts* 16 (type).

reticulata (*E. Mey*) *Benth.*; no. 53A. **Salvia coccinea** *Juss.*; no. 63, introduced.

Liliaceae: **Aloe affinis** *Berg.*; no. 309. **A. arborescens** *Mill.*?; nos. 8, 270.

Smilacaceae: **Smilax Kraussiana** *Meisn.*; nos. 303; 330.

Gramineae: **Alloteropsis semialata** (*R. Br.*) *Hitchc.*; no. 261. **Andropogon eucomis** *Nees*; no. 336. **Brachiaria brizantha** *Stapf.*; no. 251. **Stiburus alopecuroides** (*Hack.*) *Stapf*; no. 39A, from Mt. Anderson.

LIII—THE GENUS TRICHOCLADUS Pers. (Hamamelidaceae).

J. Hutchinson.

The family *Hamamelidaceae* is of considerable interest both phytogeographically and phylogenetically. Like the ancient *Magnoliaceae* its main centres of distribution are Eastern Asia and the Eastern United States of North America, a few genera of both families extending into the northern tropics. *Hamamelidaceae* seems to be an advanced group of the *Rosales*, and something of a stepping-stone between that great alliance and the so-called "Amentiferae."

With the exception of *Trichocladus* and two small genera in the Mascarene Islands (*Dicoryphe* and *Franchetia* Baill.), and a little known genus, *Ostrearia* Baill. in north-eastern Queensland, the family *Hamamelidaceae* is confined to the Northern Hemisphere. Its presence in the Southern Hemisphere, therefore, is probably due to migration from the north, the more temperate mountain ranges of the eastern half of Africa having provided the path of dispersal, *Trichocladus* being found in the forests from Harar, in Abyssinia, to as far south as the Knysna forests in Southern Africa.

In relation to the general distribution of the family, *Trichocladus* thus recalls that of *Berberis* and *Cornus*, which in the Old World are mainly in the Northern Hemisphere, but which have penetrated only as far south as the mountains of Tanganyika. These same mountains have also provided the means for the spread of families which have found their origin in the Southern Hemisphere, such as *Proteaceae*, which have migrated northwards as far as Abyssinia.

The most widely spread species of *Trichocladus* is *T. malosanus* Baker, which occurs in Harar, Abyssinia, and is common in the forests of Kenya, Tanganyika, and Nyasaland, becoming rarer in Katanga and Northern Rhodesia. There are two species found in the Kyimbila district to the north of Lake Nyasa, *T. Goetzei* Engl. and *T. dentatus* Hutch., the latter described here for the first time. *T. grandiflorus* Oliv. is a handsome-flowered species, which is confined to the north-eastern Transvaal, whilst *T. ellipticus* Eckl. & Zeyh. and *T. crinitus* Pers. occur in the forests from Natal to George.

Assuming that the family has arisen from the *Rosales* stock, those genera of *Hamamelidaceae* which still have petals, such as the well-known *Hamamelis* itself, would probably be the most ancient, and to this group *Trichocladus** belongs. Although the presence of petals indicates an ancient type, the inflorescence of most of the species of *Trichocladus* is considerably advanced, being *capitate*. In regard to the type of inflorescence, *T. grandiflorus* is the most primitive species; in this it is *spicate*. It is noteworthy that two of the species with the greatest number of advanced characters are found only at the southern limit of distribution, these being *T. crinitus* and *T. ellipticus*, and in both these the character of the indumentum, which is densely stellate, may be also regarded as being of an advanced type.

Key to the Species.

Mature leaves glabrous or nearly so below; petals rather broad, their margins not recurved:

Flowers shortly spicate; leaves acuminate, not peltate, entire.... 1. *grandiflorus*.

Flowers capitate:

Leaves rounded at the apex, not peltate at the rounded base, entire.....2. *Goetzei*.

Leaves acuminate, peltate at the base, obtusely repand-dentate in the upper half.....3. *dentatus*.

Mature leaves more or less stellate-pubescent or tomentose below; flowers capitate; petals rather narrow, with recurved margins:

Leaves peltate, loosely stellate-pubescent below; branchlets covered with rather long dark-brown hairs.....4. *crinitus*.

Leaves not or only very inconspicuously peltate, densely and very shortly stellate-tomentose below:

Leaves broadly elliptic, triangular at each end, rather large, averaging about 7–10 cm. long and 4–6 cm. broad; flower-heads rather large, solitary at the end of each shoot..... 5. *malosanus*.

Leaves lanceolate or lanceolate-elliptic, rather long-pointed at each end, somewhat small, averaging 3–5 cm. long and 1·5–2·5 cm. broad; flower-heads small, terminal and often also in the upper leaf-axils.....6. *ellipticus*.

1. **T. grandiflorus** *Oliv.* in Hook. Ic. Pl. t. 1480 (1885).

South Africa: Eastern Transvaal; forests of Lydenburg District and Barberton. Exsicc.—*Rogers* 22999; *Burtt Davy* 1480; 1650; *Galpin* 553; *Royston* 4084. *Mudd* (type).

2. **T. Goetzei** *Engl.* Bot. Jahrb. **49,** 455, fig. 1, A-G (1913).

Tanganyika Territory: Uhehe Distr.; Utschungwe Mts., near Kissinga, fl. and fr. Feb., *Goetze* 574 (type). Kyimbila Distr.; Rungwe Crater, tree-like, 24 ft., fl. Jan., *Stolz* 1067.

*Petals are absent from the female flowers of *Trichocladus*.

Trichocladus dentatus Hutch. $\times \frac{3}{5}$. A. branched hair from under-surface of young leaf. B. part of calyx, petal and stamen of male flower. C. stamen. D. rudimentary ovary of male flower; dissections enlarged.

3. **T. dentatus** *Hutch.* sp. nov. ; foliis basi peltatis mox glabrescentibus, floribus capitatis, petalis planis glabris valde distincta.

Frutex vel arbor parva usque ad 4 m. alta ; rami annotini infra nodos satis compressi, lenticellati et minute stellato-puberuli, hornotini rufo-tomentelli, internodiis 3–5 cm. longis. *Folia* opposita, late oblongo-lanceolata, acute acuminata, basi leviter peltata et truncato-rotundata, 10–15 cm. longa, 4–6 cm. lata, dimidio superiore obtuse repando-dentata, juniora utrinque rufo-tomentosa, mox glabra vel fere glabra ; nervi latearles utrinsecus circiter 10, a costa sub angulo 45° abeuntes, leviter arcuati, intra marginem anastomosantes, inter nervos venis laxe reticulatis ; petioli 1·5–2 cm. longi, supra basin versus plani, stellato-tomentelli ; stipulae mox caducae, subulatae. *Inflorescentia* ♂ axillaris, capitata, pedunculata, circiter 2–2·5 cm. diametro ; pedunculi 2–2·5 cm. longi, rufo-tomentosi ; bracteae subulatae. *Calyx* campanulatus, 5 mm. longus, extra stellato-tomentosus, lobis late ovato-triangularibus. *Petala* plana, lineari-oblanceolata, 2 cm. longa, 3 mm. lata, utrinque glabra. *Stamina* 5 ; filamenta brevissima ; antherae crassae, oblique mucronatae, 1·75 mm. longae. *Discus* annularis, pubescens. *Ovarium* rudimentarium tomentosum, stylis 2 brevibus liberis. *Inflorescentia* ♀ et fructus non visus.

Tanganyika Territory : Kyimbila Distr. ; Ukinga—Kwakalila, in Bamboo forest, shrub 12 ft., Nov., *Stolz* 2297 (type).

4. **T. crinitus** (*Thunb.*) *Pers.* Synop. **2,** 597 (1807) ; DC. Prodr. **4,** 269 ; Sond. in Harv. & Sond. Fl. Cap. **2,** 325 ; Marloth Fl. S. Afr. **2,** 25, pl. 9, C. *Dahlia crinita* Thunb. in Skrivt. Nat. Selsk. Kiobenh. **2,** 133, t. 4 (1792). *Trichocladus vittatus* Meisn. ex Sond. l.c. in syn. *T. peltatus* Meisn. in Hook. Lond. Journ. Bot. **2,** 537 (1843).

South Africa : Forests of George, Knysna, Uitenhage and Natal.

5. **T. malosanus** *Baker* in Kew Bull. 1897, 266. *T. ellipticus* var. *latifolius* Schweinf. ex Engl. Bot. Jahrb. **49,** 456, fig. 1, H-N.

Widely spread in the forests from Harar (Abyssinia), Uganda, Kenya, Tanganyika, Nyasaland, and probably rarer in the Katanga and Northern Rhodesia.

Hutchins states (in Kew Herb.) that this species forms the chief undergrowth in the Uasin Gishu forests of Kenya, at 7000–8000 ft., whilst Scott-Elliott notes that most of the woods on the Mau plateau are composed of this tree. The flowers are sweet-scented.

6. **T. ellipticus** *Eckl. & Zeyh.* ex *Sond.* in Harv. & Sond. Fl. Cap. **2,** 325 (1862) ; Marloth Fl. S. Afr. **2** : 25, pl. 9, B.

South Africa : forests of Uitenhage, Albany, Somerset East, King Williamstown (Perie Forest), Bathurst, Transkei, Komgha, Natal.

LIV—PLANT MORPHOLOGY IN ALBERTUS MAGNUS.*

T. A. Sprague.

Albert of Bollstädt (1193–1280), Bishop of Regensburg, generally styled Albertus Magnus, was a voluminous writer, one of whose books dealt with the Vegetable Kingdom. This was his " De vegetabilibus libri VII," edited by Ernst H. F. Meyer and C. Jessen (1867). Our knowledge of the botanical work of Albertus Magnus is due mainly to Ernst Meyer, who published two papers on the subject in Linnaea, **10,** 641–741 (1836), and **11,** 545–595 (1837), and gave a further account in his " Geschichte der Botanik," **4,** 9–84 (1857). Another study on Albertus as a botanist was published by Stephen Fellner in Jahres-Ber. des kais. kön. Ober-Gymnasiums zu den Schotten in Wien (1881)—this, however, I have not seen. For English readers an account in Dr. Agnes Arber's " Herbals " (1912), pp. 3–5, 7, 116, 119, 120, 134–136, is available.

The present paper is based on an intensive study of the botanical terminology employed by Albertus. The explanatory index supplied by Jessen, though extremely helpful, is far from being exhaustive, and some of the meanings of botanical terms given in it appear to be inexact ; thus *germen seminis* usually meant not the embryo as a whole, but the plumule ; *farina seminis*, which Jessen defined as albumen, occurred also in exalbuminous seeds such as those of *Leguminosae* and *Quercus*, where it denoted the food tissue within the cotyledons ; and *panniculus* apparently did not mean the capsule of *Viola* (elsewhere termed *folliculus*), but the cluster into which the seeds are aggregated. A glossary of the botanical terms used by Albertus has been prepared, and will appear shortly.

The general philosophy of Albertus was based on that of Aristotle, while the more strictly botanical part was largely derived indirectly from Theophrastus, through Nicolaus Damascenus and other channels. The book " De Vegetabilibus " consisted of seven chapters, of which the first five were theoretical, while the sixth contained descriptions of individual medicinal and economic species, and the seventh was devoted to agriculture and horticulture.

The species described in the sixth book are in two sections, including woody and herbaceous plants respectively, the plants in each section being arranged in alphabetical order. Albertus apparently thought it necessary to apologise for descending from the heights of philosophy to the description of individual species :—" In hoc sexto libro vegetabilium nostrorum magis satisfacimus curiositati studentium quam philosophiae. De particularibus enim philosophia esse non poterit." Now, after the lapse of nearly seven centuries, it is his descriptions of species that are important, both for identifying the plants concerned and for ascertaining the precise connotation of the terms employed by him. His general philosophy of the Plant World on the other hand, is now of relatively little

* See Botanical terms in Pliny's Natural History (*K.B.* 1933, 30) ; and Botanical terms in Isidorus (*K.B.* 1933, 401).

interest ; his conception of the plant being zoomorphic, he constantly endeavoured to explain its organs and mode of life by means of false analogies drawn from the Animal World. In fact, he seems to have regarded the plant as an imperfect animal.

Various references to the beliefs of magicians and sorcerers remind us that the book was written in the Middle Ages. A stick of ebony tied to an infant's cradle was said to ward off terrifying apparitions ; the fiercest bulls became tame if tied to a wild fig-tree ; the wood of the medlar was much sought by enchanters for making staffs possessed of special powers ; the juice of poplar leaves had a reputation as a contraceptive, and tying on the root of a pear-tree had the same effect ; students of magic said that willow seed was an antaphrodisiac ; mugwort (*Artemisia vulgaris*), whether carried or tied to the legs, removed the fatigue of wayfarers ; both betony (*Betonica officinalis*) and vervain (*Verbena officinalis*) were used by students of black magic for purposes of divination ; houseleek (*Sempervivum tectorum*) was said to ward off thunderbolts, and was accordingly planted on roofs. Such are some of the beliefs recorded.

The doctrine of the transmutation of species was accepted by Albertus. Wheat became converted into rye, and vice versa, according to the nature of the soil.

Albertus began by discussing whether plants were living and had souls, and gave an affirmative answer on the ground that they fed, grew, reproduced themselves and died, although they did not feel, experience desire, or sleep. He decided that neither separate sexes nor sexual processes existed in plants, but that they were of one sex, both male and female characters being combined in the same individual. Plants called " male " were relatively narrow-leaved, hard and dry, and consequently rough, and produced smaller fruits and seeds. " Female " plants, on the other hand, were relatively broad-leaved, soft and moist, and consequently smooth, and produced larger fruits and seeds.

For purposes of classification, he recognized main groups or " genera " and subordinate ones or " species," these two terms being employed in purely relative senses. Thus the " genus " *planta* was divided into the " species " *arbor, arbustum, olus virens, herba* and *fungus*. Each of these " species " in its turn became a " genus " when considered in relation to groups subordinate to itself. Albertus however, occasionally used the terms " genera " and " species " in their modern biological senses, as for instance when he observed that esula (*Euphorbia*) was not a species but a genus, and that there were many species of solatrum (*Solanum*).

In actual practice, Albertus recognized only two primary " genera " of plants, namely, woody plants (lib. vi, tract. 1) and herbaceous ones (lib. vi, tract. 2). A tree (*arbor*) was a woody plant with a single trunk (*stipes*) from its root, bearing numerous boughs (*rami*), branches and branchlets. A shrub (*arbustum*), on the other hand, had numerous main stems (*stipites* or *rami*) from its root.

Juniper (*Juniperus communis*), however, was classed as a tree, although it was branched from the root, because each of its primary stems (*stipites*) was extensively branched like the trunk of a tree. In a bush (*frutex*) there were many equal and relatively slender branches from the base. When these branches were long and not very woody, a shrub was known by the term *rubus* (e.g. *Hedera Helix*). An arborescent shrub was known as *frutex magnus*. Herbaceous plants were divided into (1) those with leafy stems of considerable size (*olus virens* or *olus*), and (2) those with all or most of the leaves radical (*herba*). Albertus recognized, however, that the distinction between *olus virens* and *herba* broke down in various instances, the beet (*Beta vulgaris*), for example, being a *herba* in its first year, and an *olus virens* afterwards. The term *herba*, moreover, was used in a general sense to include both *olus virens* and *herba* (sensu stricto). Ruta (*Ruta graveolens*) and caulis (*Brassica oleracea*) which were mentioned by Albertus (lib. i, § 155) as typical examples of *olera virentia*, were described by him later on as *herbae* (lib. vi, §§ 304, 428). The term *arbor* was also used in a general sense, including for example edera (*Hedera Helix*), which was a typical *rubus*.

The main stem and its branches and branchlets of various orders were *stipes*, *rami*, *virgae* and *flagra* respectively. The main stems of a bush (*frutex*) or caulescent herb (*olus virens*) were sometimes called *crura* instead of *stipites*. The branches of the root were known as *virgae*, doubtless on account of their length and slenderness. The term *radix* was applied not only to true roots, but to various underground stems such as the bulb of *Lilium candidum* and the corm of *Crocus sativus*.

The word *folium* denoted not only a simple leaf, but a leaflet of a compound leaf, and a segment of a dissected one. In relation to the inflorescence and flower, it was applied also to a bract, sepal or petal. Pinnate and pinnatisect leaves with a rhachis of different consistency from the leaflets—such as those of the walnut (*Juglans regia*), ash (*Fraxinus excelsior*), service tree (*Sorbus domestica*), liquorice (*Glycyrrhiza glabra*) and agrimony (*Agrimonia Eupatoria*)—were recognised as belonging to a special type, their rhachis being variously termed *ramus folialis*, *virgula parvula*, *stipes* or *linea longa*. The leaf of the elder (*Sambucus nigra*) was apparently not placed in this category, presumably on account of the softer and herbaceous nature of its rhachis.

The palmate arrangement of leaflets was described by Albertus in pentafilon (*Potentilla reptans*) :—" latine vocatur quinquefolia, eo quod quinque et quinque folia simul habet circa nodum unum." Here the term *nodus* was applied to the apex of the common petiole. In describing agnus castus (*Vitex Agnus-castus*), on the other hand, he gave no indication of the palmate arrangement of the leaflets.

A simple leaf, such as that of the hazel (*Corylus Avellana*) was said to arise directly from the wood :—" Corilus . . . habet folium immediate egrediens de suo ligno."

The pinnatifid leaves of oak (*Quercus Robur*) and henbane (*Hyoscyamus niger*) were said to be circumscribed by triangles :—" Et est totum circumpositum triangulis, quorum bases sunt super folium, et angulus est in exteriori." A palmatifid leaf with five lobes or more, as in the castor oil plant (*Ricinus communis*), was described as stellate :—" folia eius sunt maxima et rotunda ad modum stellae emittentis radios." The 3–5-lobed leaves of the hop (*Humulus Lupulus*) were distinguished from those of the vine (*Vitis vinifera*) by being circumscribed by triangles :—" sed sunt triangulis circumposita." The 3-lobed palmatifid leaves of the vine, the fig and the sycamore (*Acer Pseudoplatanus*) were described as broad and divided into three :—" Est autem frondosa vitis, et est suum folium latum, in tria divisum, sicut folia ficus et platani."

Much dissected leaves were apparently regarded as branchlets bearing many leaves :—" Fumus terrae [*Fumaria officinalis*] est herba viridis parvorum valde foliorum." Narrow segments were known as *fila* (as in *Foeniculum officinale* and *Matricaria Chamomilla*), *costae* (in *Anthemis Cotula* and *Matricaria Chamomilla*) or *lineae* (in *Foeniculum officinale* and *Pimpinella Anisum*). Occasionally, however, the whole leaf seems to have been loosely termed a *folium*, as in *Artemisia vulgaris*, where the leaf was described as divided into many parts :—" Artemesia herba est nota et usitata, habens aliquantulum folia divisa in multa." In the description of anisum (*Pimpinella Anisum*) the term *folium* seems to denote an individual segment of the leaf :—" Habet autem folia sicut feniculum per lineas divaricata, nisi quod sunt parum latiora quam folia feniculi." So also in feniculum (*Foeniculum officinale*) :—" Feniculum est herba habens multum divaricata folia, sicut si sint quaedam fila." Here *folium* was equivalent to *filum*.

A denticulate or crispate margin was said to have many angles :—" Laurus [*Laurus nobilis*] arbor est . . . habens folia . . . habentia multos angulos in circuitu." The undulate margin of the leaf in daxus (*Ilex Aquifolium*) was described as much curved :—" Quaedam autem arbores in foliis habent multas spinas, sicut arbor, quae vocatur daxus . . . Cum autem de foliis exspirat spina, contrahit folium et incurvatur ; et ideo multa curvitas est in foliis eiusdem arboris."

The petiole of a leaf was termed *crus* or *cotyledo* : " Quaedam [species betae] enim est viridis in cruribus foliorum suorum, et quaedam rubea " (485, vi, 292*) : " Circumferentia [laminae] deficit ad cotyledonem folii " (534, vi, 378). Tendrils were known as *anchae*, e.g., in *Vitis*, *Cucurbita* and *Cucumis*.

The existence of two different kind of spines—deep seated and superficial—was clearly recognized by Albertus :—" Inveniuntur autem duo genera spinarum in plantis. Sunt enim spinae, quae ex profundo plantae educuntur ; et hae quidem rectae et longae sunt

*The three figures cited indicate respectively the page, book and section of Albertus, De Vegetabilibus.

propter calorem materie. Sunt etiam quaedam spinae, quarum basis non profundatur in corpus plantae, sed stat super corticem, quasi extrinsecus adhaerens plantae ; et sunt istae spinae breves, recurvae anterius, et peracutae, sicut sunt spinae tribulorum et bedegar et rosariorum et ramni." The plants mentioned as having superficial spines are species of *Rosa* and *Rubus*.

The vascular bundles (*viae nutrimenti* or *viae venales*) were observed by Albertus, who mentions that they may be seen as threads when a leaf of plantain (*Plantago*) is slowly plucked. The bark (*cortex*) was noted by him as consisting, in large plants, of two layers, the outer one hard and dry, and the inner one softer and sappier. Wood and pith were *lignum* and *medulla* respectively. Medullary rays when conspicuous, as in the vine, were taken by him for *viae venales*.

The annual rings of Dicotyledons and Conifers were *tunicae ligneae*. The wood of the date-palm (*Phoenix dactylifera*), on the other hand, was peculiar in being composed of stakes (*asseres*) :—" Habet autem palma lignum—sicut dictum est—valde rarum et quasi ex asseribus compositum, et non ex circularibus tunicis crescens, et ideo etiam est angulosum."

The inflorescence was in some cases recognized by Albertus as a group of flowers, but in others was regarded by him as a single flower. Spikes of grasses and spike-like inflorescences of *Labiatae* were denoted by the term *spica* ; and the panicle of milium (*Panicum miliaceum*) was termed *spica divaricata*. The thyrse of *Vitis* was *botrus*. Capitula, umbels, and umbel-like or corymbose inflorescences of small flowers were regarded as single flowers :—" Sambucus . . . florem autem habet ad modum coronae formatum."

Albertus defined the " flower " as a sign of the fruit :—" flores qui sunt indicia fructuum." To him the " flower " (*flos*) was the *coloured* part of a flower or inflorescence, and did not include *green* sepals or bracts. The fig and mulberry were mentioned as producing fruit without " flowers." Sometimes the term *flos* was restricted to the expanded and petal-like parts, as in camomilla (*Matricaria Chamomilla*), the " flower " of which was described as white, the yellow disk-flowers being ignored. Sometimes the filaments or stamens, distinguished as *spicae* or *lineae*, were apparently regarded as part of the flower, as in *Clematis Vitalba*. In *Vitis vinifera* the stamens were the " flower " itself :—" Flos eius est citrinus, habens parvulas quasdam emissiones linearum, quae in superiori habent nodulos quosdam." The red stigmas were the " flower " of the hazel :—" Avellanae tamen parvulum et rubeum habent florem." Some authors considered that the red mace (aril) of the nutmeg (*Myristica moschata*) was its flower :—" Macis est folium et flos, sive folium floris muscatae." " Flos eius a quibusdam macis esse dicitur." The yellow spadix was the flower of basilicus (*Arum*) :—" Florem autem habet croceum, et facit in semine multa grana, sicut botrus, et sunt primo viridia, et postea rufa, quando

sunt matura." Among other inflorescences regarded as flowers were those of many Umbelliferae and Compositae, *Sambucus*, and *Origanum vulgare*.

Green parts enclosing the coloured "flower" were termed *folliculi*, *siliquae* or *thecae*. The "flower" (corolla) of the poppy (*Papaver*) was described as enclosed in a *siliqua* (calyx), and that of borage (*Borago officinalis*) in a *theca* (calyx). The spathe of *Arum* was termed *siliqua*, and so was the involucre of salsify (*Tragopogon porrifolius*). The three terms *folliculus*, *siliqua* and *theca* were in fact used, in the general sense of "envelope," for various members of different morphological nature.

A bract, if uncoloured and expanded, was simply termed *folium*, as in *Tilia*. A green calyx was *folliculus*, *siliqua* or *theca*. The corolla was generally *flos*. The filaments were *emissiones linearum* or *virgulae*, and the style was also a *virgula*. The filament, when considered in relation to its anther, was termed *cotyledo* (stalk). Both filaments and styles were sometimes called *spicae floris*.

The term *germen* may possibly have been used for the ovary in the case of cirpus (117, ii, 38), but its exact application in that passage is uncertain: elsewhere it was applied to a bud, plumule or embryo. Usually the ovary was not distinguished from the fruit, being regarded merely as an early stage of the latter:—"Papaver . . . profert ipsum [sc. florem] sub fructu suo in nodulo uno, qui est sub capite suo et profert eum in siliqua, qui aperitur ex parte cruris eius, et cadit flore aperto." Here the word *caput* denoted the ovary, and it was applied also to the capsule, as in Pliny: both were "heads."

Peduncles and pedicels were *cotyledones* (stalks), the former being sometimes termed *crura*, and the latter *pendiculi*. As mentioned above, the two terms *cotyledones* and *crura* were applied also to petioles, and *crura* also to stems of bushes and caulescent herbs.

Although Albertus restricted the term *flos* to the *coloured* leaves or parts of a flower or inflorescence, there are indications that he regarded the flower (in the modern botanical sense) as a distinct entity. Thus he described the flower of borage (*Borago officinalis*) as arranged like a star composed of five circles consisting of five parts each, namely, (1) *theca floris* (calyx), (2) *folia floris* (corolla-lobes) (3) *parvulae eminentiae in flore ipso* (corona-segments), (4) *quinque virgulae* (stamens), and (5) *una virgula* (style), nos. (4) and (5) collectively being termed *spicae floris*. Here the calyx to the outside, and the stamens and styles to the inside, were recognised as subsidiary parts of the flower (*flos*):—"Borago . . . habet . . . florem iacinctinum, ut stellam dispositum in quo est compositio quinque quinariorum. Quorum primus est exterior, qui fuit theca floris, et est viridis, secundus autem est iacinctinus, qui est folia floris, et postea sunt quinque parvulae eminentiae in flore ipso, et sunt quasi primae extremitates foliorum iacinctinae superius, et inferius albae; post illas ad intrinsecus floris sunt quinque

virgulae iacinctinae longae et rectae ; et in medio illarum est una virgula longior eis, et illae sunt spicae floris."

Albertus observed that " flowers " (*folia floris*) without stamens (*lineae interiores, linearum emissio*) inside them were not found, but that stamens without " flowers " outside them occurred in the vine, and perhaps in the beet (*Beta vulgaris*) :—" Exteriora enim lata folia floris sine lineis interioribus non inveniuntur, sed linearum emissio invenitur sine exterioribus foliis floris, ut in vite in arbore, et forte in herba, quae dicitur blitus, ut quidam dicunt, quia hoc non sum ego expertus " (463, vi, 246) : " Est tamen non praetereundum hic, quod omnis fere flos cuiuscunque sit plantae, in medio sui huiusmodi habet granulorum congeriem per parvulos cotyledones fundo floris infixam " (156, ii, 133).

In the white lily (*Lilium candidum*) Albertus remarked the absence of a green *siliqua* (calyx) outside the " flower," and the presence of six filaments bearing anthers (*crocei nodi molles*) and a style with a stigma (*nodus sicut clavus*) :—" Nec est siliqua viridis et theca, in qua flos generatur, sicut in papavere : sed ipsa floris folia a viridi transeunt in album colorem ; et tunc flos aperitur ex parte anteriori. Flos autem habet folia sex, et in medio profert virgulam longam, quae habet nodum sicut clavus aut terminus ; et illa stat in medio lilii, et est crocea, et circa eam stant breviores quaedam et debiliores virgulae, omnes habentes croceos nodos molles, cum tamen folia lilii sint alba." He observed that, in every flower composed of several series [whorls] of leaves, each leaf of an exterior series covered the space between two leaves of the series next inside it, i.e., that successive floral whorls alternated with one another :—" Sub qualibet compaginatione duorum foliorum siliquae [sc. duorum sepalorum] subicitur recte medium dorsum unius folii rosae [sc. unius petali]. Et hic ordo observatur etiam in rosae foliis, quod semper dorsum interioris folii porrigitur directe ad rimam exteriorum duorum foliorum, et ad rimam interiorum foliorum obicitur dorsum folii exterioris ordinis. Et hoc habet rosa commune cum aliis floribus, quorum siliquae et flores ex multis ordinibus foliorum componuntur, sicut patet in flore boraginis et herbae, quae vocatur pes cornicis, et in multis aliis : et hoc facit natura ne humor aut aliud nocumentum exterius facile penetrare possit ad interius germinis. Si enim unum ordinem penetraverit, in alio inveniet resistentiam " (447, vi, 214, 215).

Albertus distinguished " flowers " (*flores*) of two kinds : those situated on top of the fruit, e.g., *Pyrus, Malus, Cucurbita, Punica* and *Rosa* ; and those beneath or round the fruit, e.g., *Prunus, Amygdalus* and *Papaver* (153, ii, 128 ; 155, ii, 130 ; 446, vi, 213). He observed that nectar was produced inside the flowers at the bottom, e.g., at the base of the corolla-tube of *Lamium* (150, ii, 121). Pollen (*formale croceum*) occurred in the flowers of *Papaver, Tilia* and *Betula* (mirica), and more or less in all flowers, and adhered to the hind legs of bees collecting honey (157, ii, 122).

The shapes of flowers included the "aviform," seen in aquilea [*Aquilegia*], which consisted of four [really five] eagle-like parts. The zygomorphic corollas of *Lamium* and *Viola* were mentioned as belonging to a similar type. The papilionaceous flower of *Melilotus* was described as "flos lunaris" (537, vi, 385). Campanulate flowers were seen in enula campana, and pyramidal (i.e., obconical or funnel-shaped) ones in ligustrum (*Calystegia sepium*). The commonest type of flower, however, was the stellate, typified by *Rosa*. Many flowers, e.g., those of *Lilium*, *Agrostemma* and *Punica* were intermediate between the campanulate and stellate type. The description of enula campana suggests *Digitalis purpurea* rather than *Inula Helenium*. It had leaves like those of comfrey (*Symphytum officinale*) and campanulate-funnel-shaped red flowers. Finally it possessed diuretic properties. These various details suggest *Digitalis* rather than *Inula*.

The persistence of the calyx for a time in *Rosa*, and on the ripe fruit in *Mespilus*, was noted by Albertus (447, vi, 215), and so was the persistence of the stamens round certain fruits (462, vi, 246).

Albertus paid particular attention to the morphology of fruits. Dry one-seeded fruits, such as achenes, cypselae and caryopses, were naturally regarded by him as seeds (*grana*), as in *Clematis Vitalba*, *Rosa*, *Compositae*, and cereal grasses. The pericarp of an achene or cypsela was termed *pellicula* and that of a caryopsis was *tela*. "Seed" in a collective sense was *semen*; and a "seed-vessel," whether dry or fleshy, was *vas seminis*, that designation being applied equally to the dry capsule of *Agrostemma Githago* and the fleshy pseudocarp of *Rosa*.

Nuts were *nuces*: these included walnuts, coconuts, hazel-nuts, chestnuts and acorns. The pericarp or endocarp, if hard and shell-like as in *Juglans*, *Cocos* and *Corylus*, was termed *testa*, and if softer and flexible, as in *Castanea* and *Quercus*, it was *casta*.

Dry dehiscent fruits were known generally as *siliquae*, a term applied to the capsules of *Papaver* and *Reseda*, and the legumes of *Cicer*, *Faba*, *Vigna*, *Pisum* and *Lens*. The legumes of *Lens* and *Vicia sativa* were mentioned also under the name *castae*.

Albertus had no special name for capsule: those of *Papaver* and *Agrostemma* he mentioned as *caput* and *vas seminis* respectively. That of *Viola* which had fewer and larger seeds he termed *folliculus*. Those of *Agrostemma Githago* and *Hyoscyamus niger* were also termed *thecae*, and so were the follicles of *Paeonia*. The three terms, *siliqua*, *folliculus* and *theca* were in fact used rather loosely in the sense of dry seed-vessels or pericarps. They were applied also to involucres, spathes and calyces, as mentioned above.

The designation *pomum* included not only true pomes, e.g., of *Pyrus*, *Malus* and *Cydonia* but other large and medium-sized fleshy fruits, such as those of *Citrus*, *Citrullus*, *Punica* and *Rosa*, and even woody fruits such as the cones of *Pinus* and *Cupressus*. The horned woody capsule of *Buxus* was described as *pomulum aculeatum superius*.

There were no special terms for drupes and berries as such, but the former were described as having flesh and bone, and the latter only flesh round the seed:—" Fructus . . . quidam componuntur ex carne et osse et grano, sicut pruna secundum omne genus suum ; quidam autem ex carne et grano, sicut cucumeres ; et quidam ex carne et osse, sicut dactili " (84, i, 177). Here the horny endosperm of the date was termed the bone (*os*) of the fruit.

Seeds generally were *semina* ; if relatively large they were termed *grana* ; occasionally, as in *Malus*, the whole seed was known as *nucleus*, but that term was generally restricted to the seed without its coat (kernel).

The seed-coat (testa of botanists) was termed *pellicula*, *pellis* or *tela* : the term *testa*, on the other hand, seems to have been reserved for hard pericarps or endocarps :—" Fructuum enim habent aliqui tres cooperturas—sicut nuces habent circa testam carnem quandam et testam et interiorem pellem, et amigdala similiter et persica et multa alia " (64, i, 128) : " Habet oliva etiam fructum, qui exteriorem corticem habet terrestrem ; et in ipso est caro pinguissima, quae dicitur adeps olivae, ex qua exprimitur oleum ; in cuius medio habet os durissimum, et in illo nucleum pellicula tenui involutum, sicut involvuntur alii nuclei nucum " (419, vi, 158).

The plumule, being the " sprout " of the embryo, was termed *germen* :—" Quaedam [semina] faciunt germen suum in summo farinae suae, sicut cicer faba et glandes nux et avellanae " (186, iii, 58). The cotyledons, if hypogeal or thick and fleshy, were not recognized as leaves, but as two parts into which the kernel was divided, as in *Laurus*, *Amygdalus* and *Quercus*. The radicle was of course the young root.

Summary.

From a general survey of the morphological system of Albertus, it is evident that he laid the greatest stress on the function of the various parts of the plant, and that their consistency or texture came next in order of importance. Hence particular terms were applied by him rather to analogous organs than to homologous members.

Among the advances in plant morphology made by Albertus Magnus were the recognition of the existence in many flowers of several alternating whorls, as in *Borago officinalis* ; the observation that stamens occurred in almost all flowers, and the distinction of filament and anther (and of style and stigma in *Lilium candidum*) ; and the discrimination of the various layers of tissue found in fruits.

As regards vegetative characters he failed to appreciate the importance of the opposite, whorled or spiral arrangements of leaves, which had been indicated by Theophrastus. On the other hand he recognised the pinnate leaf of *Juglans*, *Fraxinus* and *Sorbus domestica* as representing a special type of leaf arrangement, though he apparently failed to observe that *Sambucus* also had leaves of that

type. Theophrastus had suggested that the pinnate leaf of *Fraxinus* might be regarded as a single leaf, since it fell off as a whole : to Albertus, however, it was a special branch or axis bearing leaves.

Albertus noted that the infructescence (*botrus*) of the vine was borne opposite a leaf, and that a tendril was sometimes produced in its place, and he came to the conclusion that the tendrils were incomplete *botri*, modified for the purpose of supporting the plant—a remarkable instance of reasoning from homology.

He recognised that the stems of most plants grew by the formation of one layer outside another—" Tunc crescit planta quasi per quasdam tunicas herbales vel ligneas, quarum una superponitur alteri " (121, ii, 49)—and observed that the date palm was an exception (428, vi, 179). At the same time it seems going a little too far to assume that Albertus had in mind a classification in which the Monocotyledons (as " corticate plants ") were distinguished from the Dicotyledons and Gymnosperms (" tunicate plants "). His recognition of two kinds of spines, superficial and deep-seated, is dealt with above.

Albertus Magnus was an acute observer who recorded what he saw : to this is due his high position in the history of mediaeval botany.

LV—BOTANICAL TERMS IN ALBERTUS MAGNUS.*

T. A. Sprague.

One of the principal difficulties encountered in reading mediaeval botanical works is the strange yet deceptively familiar terminology employed in them. Many botanical terms still current nowadays were then used in very different senses, and certain words possessed a more general signification, covering several morphological categories now recognized as distinct. The word *cotyledo* illustrates both difficulties : now the equivalent of cotyledon, in Albertus it meant a stalk of various kinds—petiole, peduncle, pedicel, filament or funicle. Other modern terms used by Albertus with different or additional meanings were : *arillus, arista, folliculus, legumen, nodus, pomum, racemus, siliqua, spica, stipula, testa, theca, virgula.* The word *siliqua*, now applied to the capsular fruit characteristic of *Cruciferae*, was used by Albertus to denote a spathe, glumes of a grass spikelet, a calyx, a dry seed-vessel or pericarp, and the cartilaginous " endocarp " of a pome. A further source of difficulty is the employment of two or three different words in practically the same sense : thus the three terms *folliculus, siliqua* and *theca* were used more or less indiscriminately with the general meaning of closed covering. Similarly *camera, casa* and *cellula* were equivalents of loculus.

*See Botanical terms in Pliny's Natural History (*K.B.* 1933, 30) ; Botanical terms in Isidorus (*K.B.* 1933, 401) ; Plant Morphology in Albertus Magnus (*K.B.* 1933, 431).

The gradual change of meaning of certain terms from the first through the seventh to the thirteenth century is illustrated by the word *arbustum*. This was used by Pliny in its classical sense of plantation of trees, on which vines were trained ; by the time of Isidorus it had acquired the additional meaning of sapling ; and in Albertus Magnus it meant shrub—the equivalent of the French word arbuste. Thick, as applied to leaves, was *spissus* (not *crassus*) in Albertus, and narrow was *strictus* (not *angustus*). *Reticulatio* denoted the reticulation of veins in a leaf—previous writers do not seem to have paid much attention to this character, and Albertus was possibly the first to use the word in this sense.

Caducous members whose function was not understood by Albertus were naturally considered by him as excreta : thus the male catkins of *Alnus*, *Corylus* and *Juglans* were called *purgamenta* or *superfluitates*. Similarly pollen (*formale croceum*) was regarded by Albertus as a secretion of bile (*cholera*).

Glossary.

abstergere, to cleanse ; *abstersio*, cleansing ; *abstersivus*, having cleansing properties, abstersive :—" Hac autem virtute videtur etiam perfici operatio, quam in multis plantis invenimus, quod videlicet abstergunt et excoriant ea, quae tangunt. Abstergendo enim non tollerent humidum a superficie aliqua, nisi per siccum ; nec excoriarent, nisi per siccum peracutum ; sicut faciunt agnus castus et aristologia, quae tantae sunt abstersionis, quod etiam pellem evellunt ab his, quibus superponuntur " (335, v, 112).

abusivus, misapplied, improperly used (29, i, 51).

acetositas, acidity (195, iii, 79).

acetosus, (*sapor*), acid, cold and sharp (taste), e.g. of vinegar (197, iii, 83).

acuitas, sharpness (of spines) (333, v, 102).

aculeus, (1) prickle :—" Crocus est duorum modorum. Unus [*Carthamus tinctorius*] est olus altum habens aculeos et folia lata " (488, vi, 297) : " Brachia eius [sc. *Humuli Lupuli*] sunt aculeata parvis ut lanugo aculeis, et sunt aspera in tactu, et sunt torta " (525, vi, 361) ; (2) adventitious root of ivy, *Hedera Helix* :—" Edera quidem repit super sibi vicina, sed hoc non facit anchis, sed potius quibusdam aculeis, per quos sugit " (459, vi, 238).

acutus (*sapor*), pungent, hot and biting (taste), e.g. of mustard (197, iii, 83).

adaequare, to level (600, vii, 27).

adaequatio (*terrae*), levelling (of the soil) (600, vii, 25).

adurere (lit. to set fire to, burn), to damage :—" Est autem papaver zizania avenae, et adurit eam et exsiccat trahendo nutrimentum eius a radice ipsius " (554, vi, 420).

ambragyon, shrub (vide *arbustum*).

amurca (class. lees or dregs of olive oil), stone (endocarp) of *Olea europaea* (419, vi, 159).

anca, *ancha*, tendril (458–9, vi, 236, 238).

ante fructum=supra fructum, above the fruit :—" Situs autem florum, ut superius diximus, aliquando est ante fructum, in principio fructus ex parte suprema ipsius ; et iste modus in omnibus notis apud nos invenitur piris et malis et malis granatis " (153, ii, 128).

anterior, distal :—" Et est quoddam papaver marinum, cornutum, cuius anterior pars est sicut cornua tauri " (554, vi, 420).

apertio, lit. opening, e.g. of cones (366, vi, 60) ; *apertio terrae*, breaking up the soil (600, vii, 25).

arbor, tree :—" Arbor enim est, quae habet ex sua radice stipitem fortem, super quem nascuntur rami plures, et in ramis virgae plurimae, et in virgis ea, quae vocantur flagra plurima, sicut oliva et cypressus et fici sive ficulneae " (75, i, 153).

arbustum, shrub :—" Plantae autem, quae sunt mediae inter arbores et herbas, quae dicuntur ambragyon graece, et latine arbusta, habent emissos a radicibus suis multos ramos per modum palmitum. Et sunt trium generum, quoniam quiddam est sicut id, quod graece dicitur magnus, et aliud est sicut cannae arundinum magnarum, et tertium est sicut frutex " (75, i, 154) : " Arbusta enim sunt quasi busta arborum dicta, quae siccitate terrestri et forti calore adurente ad perfectionem arborum non perveniunt, licet figuras arborum habere videantur " (111, ii, 22).

area, *areola*, garden bed :—" Areae autem in hortis angustae faciendae sunt et longae et altae, ut multum virtutis in se areola retineat " (643, vii, 136).

arillus, seed of a grape :—" Arilli pro certo sunt semina vitium " (76, i, 148) : " Quaedam grana seminaria, quae sunt in uva et vocantur arilli " (460, vi, 239).

arista, ear of corn :—" Stipes plantae in frugibus . . . ab illo [sc. nodo tertio] usque ad aristam sive ad culmum subtiliatur valde et acuitur " (118, ii, 40) : " Granum eius [sc. frumenti] est in circuito calami, qui multum subtiliatur in medio aristae, ubi sunt grana " (519, vi, 349).

asper, (1) rough :—" Quercus autem est arbor magna . . . multum asperi corticis, quando antiquatur, sed laevem habet in iuventute " (440, vi, 203) ; (2) prickly, e.g. the leaves of *Ilex Aquifolium* and *Rosa rubiginosa* :—" Daxus habet asperum folium valde, et similiter bedegar " (82, i, 168) : " Quaedam autem arbores in foliis habent multas spinas, sicut arbor quae vocatur daxus " (266, iv, 115).

azulinus, *azurinus*, blue, lilac, violet, purple (478, vi, 275 ; 484, vi, 289 ; 575, vi, 464 ; 579, vi, 471).

balaustia, flower of the pomegranate :—" Granatum habet florem rubeum sicut rosa, et ille vocatur balaustia " (397, vi, 118).

barbulae (lit. little beards), laciniae of the foliar sheath of *Equisetum* (505, vi, 325).

bladum, corn (261, iv, 101 ; 544, vi, 399).

botrus, bunch of grapes (459, vi, 239).

brachium (lit. arm), long branch, e.g. of *Humulus Lupulus* (525, vi, 361).

bucca (lit. the cheek, hence mouth), depression at the apex of a fruit, e.g. of an apple (403, vi, 129).

caespes, greensward, turf (636, vii, 120–124).

calamus, culm of a cereal (117, ii, 40 ; 518, vi, 348).

camera, loculus :—" Siliqua interius est dura per quinque . . . cameras divisa, et in qualibet camera grana aliquot seminum continens " (166, iii, 7).

canna, cane, bamboo, hollow reed-like stem :—" Cannae arundinum magnarum " (76, i, 154) : " Haec [*Ricinus communis*] enim cannam habet pro stipite " (347, vi, 20).

capsa (lit. box, case), (1) outer covering of the terminal bud of the date-palm (429, vi, 179) ; (2) spathe of a date-palm (427, vi, 177) ; (3) locellate fruit of *Cassia Fistula* (375, vi, 75).

caput (lit. head), (1) bulb of *Allium* (549, vi, 409) ; (2) ovary and capsule of *Papaver* (554, vi, 419).

caro (lit. flesh), (1) tissue of a plant, whether woody or herbaceous :—" Caro, lignea vel herbalis, plantarum " (74, i, 149) ; (2) wood :—" Interior autem color carnis plantarum albus et croceus est, sicut in carne cedri et brisilii, et aliquando quasi glaucus, sicut in ligno aloës, et aliquando niger, sicut in ebeno nigra " (134, ii, 79) ; (3) flesh of a berry or drupe :—" Ex componentibus autem diversificantur fructus, quoniam quidam componuntur ex carne et osse et grano, sicut pruna secundum omne genus suum, quidam autem ex carne et grano, sicut cucumeres ; et quidam ex carne et osse, sicut dactili " (84, i, 177).

casa (lit. house, cabin), loculus of a fruit (403, vi, 129).

casta, (1) pericarp of a nut, e.g. of *Quercus* and *Castanea* :—" In quibusdam [fructibus cooperculum] autem vocatur casta, ut in glande et castanea " (85, i, 177) ; (2) pericarp of a legume, e.g. of *Lens*, *Vicia*, *Pisum* and *Cicer* (531, vi, 372 ; 579, vi, 472).

casus, fall, shedding of leaves, flowers and fruits :—" Hae enim sunt causae casus foliorum et florum et fructuum " (67, i, 133).

caulis, cabbage, *Brassica oleracea* (493, vi, 304).

cellula, (1) loculus of a fruit (367, vi, 61) ; (2) compartment formed by the fleshy covering of a seed (367, vi, 61).

citrinitas, a greenish yellow colour (299, v, 24 ; 501, vi, 314).

citrinus, greenish yellow, lemon yellow, pale yellow :—" Dicunt autem quidam, quod vitis non facit florem, sed quod adhaeret ei, est pulvis citrinus " (462, vi, 246) : " Flos eius est citrinus " (493, vi, 303) : " In medio autem dorso folii . . . est vena citrina declinans ad albedinem " (521, vi, 352).

concavus, (1) hollow, fistular, e.g. stems of *Umbelliferae* (476, vi, 272) ; (2) concave :—" Concavus enim invenitur omnis flos notus apud nos " (159, ii, 140).

convalescere (lit. to recover, regain strength), to grow, establish itself :—" Sunt autem quaedam plantae humidae aquaticae molles, et illae, quocunque modo infigantur terrae, de facili radices emittunt et convalescunt " (120, ii, 48) : " Pullulat [oliva] autem etiam a

nucleo suae amurcae. Sed melius convalescit a ramis infixis in terram vel insitis " (419, vi, 159).

cooperculum (lit. cover), pericarp, seed vessel (85, i, 177).

coopertorium (lit. cover), (1) cone-scale of *Cupressus* and *Pinus* (365, vi, 58, 60) ; (2) pericarp of *Punica* (366, vi, 60).

coopertura, covering, e.g. (1) leaves :—" Habent . . . perfectiores plantae . . . folia in cooperturam fructuum " (61, i, 124) ; (2) calyx (151, ii, 124) ; (3) flesh and stone of a drupe, and seed-coat :—" Fructuum enim habent aliqui tres cooperturas :—sicut nuces habent circa testam carnem quandam et testam et interiorem pellem, et amigdala similiter et persica et multa alia " (64, i, 128).

corona, lit. a garland, crown, applied to a flat-topped inflorescence or infructescence, e.g. of *Origanum* and *Sambucus nigra* :—" Origganum . . . granum suum profert in modum coronae " (544, vi, 398) : " Sambucus . . . florem autem habet ad modum coronae formatum " (450, vi, 220).

coronalis, like a crown, e.g. the inflorescence of *Daucus* :—" Daucus . . . habet florem album coronalem " (506, vi, 328).

coronaliter, arranged like a crown, e.g. the flat-topped infructescences of *Umbelliferae* and *Sambucus* :—" Feniculum habet florem croceum, et coronaliter disponit fructum sicut anetum et sambucus " (517, vi, 346).

cortex, (1) bark :—" Cortex autem duplex est in plantis magnis, exterior scilicet durior, et interior mollior et succosior " (59, i, 116) ; (2) hard outer layers of a sedge or rush stem (503, vi, 320) ; (3) skin of a drupe :—" Fructus olivae . . . habet corticem et carnem et testam durissimam et nucleum, qui est semen eius " (64, i, 128) ; (4) skin of a berry, e.g. of *Phoenix* (427, vi, 176) ; (5) pericarp of a seed-like fruit (172, iii, 19) ; (6) testa of a seed :—" Cortex seminis " (64, i, 128) : " Quarta substantia est corticis nucleorum " (403, vi, 129).

costa, lit. a rib, applied to : (1) rhachis of a pinnate or pinnatisect leaf, e.g. of *Juglans*, *Fraxinus*, *Agrimonia* (482, vi, 283) ; (2) capillary leaf-segment of *Matricaria Chamomilla* (486, vi, 294) and *Conium maculatum* (502, vi, 317).

cotyledo, a stalk : (1) petiole (493, vi, 304 ; 534, vi, 378) ; (2) peduncle of a flower or fruit (140, ii, 93 ; 152, ii, 124) ; (3) pedicel of a flower (530, vi, 370) ; (4) filament of a stamen (155, ii, 132) ; (5) funicle of a seed (513, vi, 337).

croceitas, yellowness (181, iii, 41 ; 553, vi, 418).

croceus, lit. saffron-coloured, but used in the general sense of yellow (160, ii, 141 ; 488, vi, 297).

crus, lit. leg, hence stalk : (1) *crura*, stems, e.g. of *Rubus* (444, vi, 210), *Cucurbita* and *Cucumis* (500, 501, vi, 312, 314 ; (2) *crura*, stems arising from a common root :—" Altea habet folia sicut malva, sed est maior ea, habens crura longa plurima ex radice una " (483, vi, 285) ; (3) main stem :—" Crus sive truncus " (493, vi, 304) : " Stipes sive crus eius est quadratum " (497, vi, 309) : " Crus longum

altitudine duorum cubitorum" (530, vi, 370); (4) branch:—"Incipit crura sive ramos emittere" (421, vi, 163); (5) petiole:—"Quaedam [beta] enim est viridis in cruribus foliorum suorum, et quaedam rubea, et haec est maior et melior" (485, vi, 292); (6) peduncle:—"Habet autem [papaver] folium latum, et crus longum, in quo sunt capita sua . . . et profert [florem] in siliqua quae aperitur ex parte cruris eius" (554, vi, 419).

culmus, lit. a straw, culm of a grass:—(1) peduncle:—"Et videtur omnium nucum esse proprium, quod multae simul pullulant in culmo uno: sed plurimae sunt in culmo magnae nucis" [sc. *Juglandis regiae*] (415, vi, 150): "Aliae autem plantae sine siliqua in simplici pellicula grani, nuda proferunt grana, in culmis infixa, sicut carduorum genera" (167, iii, 9); (2) rhachis of inflorescence, e.g. of *Ricinus*:—"Fructus autem eius multorum est granorum in culmo uno, et est longus culmus ille sicut botrus" (348, vi, 20); (3) spike, e.g. of *Dipsacus* and cereals:—"Magnus culmus spinarum longarum ante recurvarum" (577, vi, 466): "Ordei et avenae culmi" (640, vii, 128); (4) stylar column of *Rosa arvensis*:—"In medio autem eius est respersio crocea, stans in culmo uno simul" (445, vi, 213).

cyphus=scyphus (60, i, 120).

dentes, lit. teeth, applied to the bulbils of *Allium* (482, vi, 284).

diffusus, spread out:—"Quarundam [folia] sunt diffusa valde, sicut vitis et platani, et arboris quae vocatur arbor paradisi, cuius folium habet latitudinem quasi cubitalem" (82, i, 168).

divaricare, to spread out:—"Porrum [*Allium Porrum*] . . . habet caput, ex quo divaricat radices" (549, vi, 409).

divaricatus, spreading, divaricate or diverging, applied to the final segments of much dissected leaves of *Umbelliferae*, *Compositae* and *Cruciferae*:—"Anisum [*Pimpinella Anisum*] . . . habet autem folia sicut feniculum per lineas divaricata" (476, vi, 272): "Feniculum est herba habens multum divaricata folia, sicut si sint quaedam fila" (517, vi, 346): "Nasturcium [*Lepidium sativum*] habet folia divaricata" (541, vi, 393): "Abrotanum [*Artemisia Abrotanum*] est herba divaricata" (480, vi, 280); and to roots of *Allium*:—"Allium . . . radicem autem habet divaricatam sicut porrum" (482, vi, 284).

domesticus, (1) cultivated (79, i, 163; 267, iv, 117), hence interior, nearer (proximal), or adaxial; (2) adaxial (side):—"Stipites foliorum betae et caulis hanc [trigonam] figuram habent. . . . Tertius arcus, qui est ad domesticum plantae, concavum habet in exteriori superficie" (131, ii, 71, 72); (3) nearer:—"Radios illos abbreviat versus domesticum cotyledonis" (348, vi, 20): "Maius folium in extremitate insertum super folium minus versus domesticum folii" (364, vi, 55); (4) interior:—"Ista . . . disponuntur in interiori huius carnis—hoc est ex parte domestica ipsius" (362, vi, 52).

emissiones linearum, filaments (462, vi, 246).

expansus super terram, more or less spreading (patent or patulous), e.g. the leaves of *Symphytum officinale* :—" Folia . . . expansa sunt super terram, sicut folia consolidae maioris " (509, vi, 332)—opposed to erect :—" Raphanus [*Armoracia lapathifolia*] . . . est radix maior et longior ea, quae communiter radix vocatur [*Raphanus sativus*], erecta, non expansa super terram " (557, vi, 425).

experimentum, experience, observation (340, vi, 1).

falsarius, adulterator :—" Semen [juniperi] . . . in figura et colore est sicut cubebae, sed est amarum valde ; et ideo etiam falsarii deceptores permiscent eam cum cubebis " (399, vi, 122).

farina, (1) flour (150, ii, 122) ; (2) food material of seed—whether endosperm or embryo :—" Semina omnia ex duobus corporibus constituuntur, quorum unum est terrestre, et est cortex seminis, et alterum est farina ipsius seminis " (64, i, 128) : " Substantia nucleorum, quae vocatur farina nuclei " (403, vi, 129).

farinalis, having the nature of flour (441, vi, 204).

fila (lit. threads), (1) narrow segments of a dissected leaf (486, vi, 294) ; (2) the dried stigmas of the saffron crocus (489, vi, 297).

fissura (lit. cleft), line of dehiscence, ventral suture of a legume :—" Producit etiam haec herba [*Faba vulgaris*] siliquam longam, in qua secundum ordinem sunt multa semina, sugentia ab ipsa per cotyledonem iuxta fissuram siliquae " (513, vi, 337).

flagrum, ultimate branchlet or shoot, shoot used as a scion in grafting :—" Nascuntur . . . in ramis virgae plurimae, et in virgis ea, quae vocantur flagra plurima " (75, i, 153) : " Inserentes quaerunt parva flagra recentia " (623, vii, 82).

flagrum aquaticum, water shoot (61, i, 124).

flos, coloured part of the flower or inflorescence : (1) corolla :—" In folliculis autem et siliquis flores formantur propter teneritudinem ipsorum ; aliter enim frequenter laederentur frigore " (151, ii, 124) : " Et viridis quidem nunquam inventus in aliquo flore " (160, ii, 141) ; (2) stamens :—" Flos eius [sc. *Vitis*] est citrinus, habens parvulas quasdam emissiones linearum qui in superiore habent nodulos quosdam " (462, vi, 246) ; (3) red stigmas of *Corylus Avellana* (153, ii, 127) ; (4) red aril of *Myristica moschata* (404, vi, 130) ; (5) inflorescence :—" Sambucus . . . florem autem habet ad modum coronae formatum " (450, vi, 220) ; (6) spadix of *Arum* (485, vi, 290).

folium, (1) foliage-leaf :—" Borago habet folia aspera " (485, vi, 291) ; (2) leaflet :—" Fraxinus . . . folia multa producit ex uno stipite sive ramo foliali " (391, vi, 108) : " Folia autem eius [sc. *Juglandis regiae*] sunt magna, et plura eorum oriuntur ex una linea longa ex arbore egrediente, et in hoc convenit cum fraxino et liquiricia " (414, vi, 147) ; (3) segment of a dissected leaf :—" Feniculum est herba habens multum divaricata folia sicut si sint quaedam fila " (517, vi, 346) ; (4) sepal :—" Siliquae [florum rosae] . . . compositae ex quinque foliis " (446, vi, 214) ; (5) petal :—" Rosa multorum foliorum, quando est hortensis " (445, vi, 213).

folliculus, closed covering: (1) covering of bud-scales:—" Plantarum autem, quae longe folium distans habent a radice, quarum sunt lignea corpora, in folliculo cooperta producunt folia " (142, ii, 101); (2) calyx:—" In folliculis autem et siliquis flores formantur propter teneritudinem ipsorum " (151, ii, 124); (3) capsule:—" Hoc cooperculum . . . in quibusdam vocatur folliculus, sicut in viola " (85, i, 177).

formale, substance, material, e.g. *formale croceum*, pollen:—" Videtur autem huiusmodi formale croceum maxime in floribus papaveris et tiliae et miricae; est autem secundum plus et minus in omnibus, et adhaeret posterioribus cruribus apum, quando mella colligunt " (151, ii, 122).

fructus, fruit, in a general sense, including drupes, berries, legumes, capsules, caryopses, nuts (84, i, 177).—Albertus considered that a fruit was absent in certain plants, e.g. *Salix* and *Agrimonia*. He regarded the pseudocarp of *Agrimonia* as a seed (482, vi, 283), and stated that *Salix* produced no fruit in Germany, unless the down which separates from it towards the autumn be regarded as such (449, vi, 218).

fruges, cereal grasses, corn:—" Frumentum et ordeum et cetera grana frugum " (642, vii, 134).

frumentum, wheat (518, vi, 348).

frutex, bush:—" Vocamus enim frutices ea, quae multos ex una radice ramos emittunt, cum tamen sunt lignei rami, sicut sunt spineta quaedam " (76, i, 154): " Frutex est, quando palmites multi egrediuntur de radice una, et illi sunt et similes et aequales " (70, i, 139).

frutex magnus, arborescent shrub:—" Fere autem omnis planta sub his cadit nominibus [arbores, arbusta, herbae]. Fere autem dico propter fruticem magnum, qui medius inter arbustum et arborem esse videtur, plus tamen ad arborem declinans " (75, i, 151).

fusticulus, lit. small piece of wood, applied to the cone-scale of *Cupressus* and *Pinus* (365, vi, 57).

gemma, bud:—" Quaedam autem producunt ea [sc. folia] ex suis gemmis; et hoc est commune fere omnibus arboribus quae gemmas habent, ex quibus et folia formantur et flores, praeter eas, quae nuces ferunt " (98, i, 199).

germen, lit. sprout, bud; hence: (1) sprouting from a bulb or seed:—" In ipsa [cepa, i.e. bulb of *Allium Cepa*] est maior virtus germinis eius post semen eius " (487, vi, 295); (2) sprouting from a corm:—" Alius [*Crocus sativus*] est hortensis qui habet radicem dentatum sicut lilium, et in illa est virtus germinis eius " (488, vi, 297); (3) sprouting from a rhizome:—" Germen suum magis habet in radice quam in semine " (582, vi, 478); (4) plumule:—" Quaedam [semina] faciunt germen suum in summo farinae suae, sicut cicer faba et glandes nux et avellanae, et muscatae sicut dicitur sunt eiusdem naturae. Quaedam autem germen producunt ex infimo farinae suae, sicut grana tritici et ordei et avenae, quaedam

autem faciunt in circuitu suae farinae sicut oliva et allium " (186, iii, 58 ; cf. etiam 260, iv, 99) ; (5) embryo :—" Sexta est substantia germinis, quae est interius immixta ossi dactili " (427, vi, 176) ; (6) ovary (?) :—" Eius germen quasi nullum esse videtur, nisi lanugo quaedam ad modum rarae stupae apparens in summitate ipsius " (117, ii, 38) : " Germen et semen " (117, ii, 37).

germinare, to sprout, shoot forth :—" Virtus germinandi in vite est in radice et stipite et flagellis eius et in arillis, sed maxime in ramis flagellorum, quia ex arillis aut nihil nascitur, aut, quod egreditur, vix convalescit in fortem vitem " (461, vi, 244).

germinatio, sprouting of seedlings, leaf-buds, flower-buds ; growth of an ovary into a fruit (257, iv, cap. ii).

glans, acorn :—" Fructus autem eius [sc. quercus] glans vocatur . . . Glans autem habet extra se siliquam duram, in qua continetur, quae quasi lignea est " (440, vi, 204).

gramen, grass or grass-like plant, especially in pastures and lawns (631, vii, cap xii ; 636, vii, cap. xiv) ; *gramina aspera*, sedges (631, vii, 105).

granulum (lit. a small grain), anther :—" Omnis fere flos, cuiuscunque sit plantae, in medio sui huiusmodi habet granulorum congeriem per parvulos cotyledones fundo floris infixam " (156, ii, 133).

granum, (1) grain (caryopsis) of a cereal grass :—" Illud genus plantae [sc. frugum] habet grana solida multae farinae " (117, ii, 40) ; (2) a cereal grass :—" Frumentum est de genere granorum " (518, vi, 348) : " Ordeum est granum, cuius herba est calamus cum nodis, sicut et alii calami " (544, vi, 399) ; (3) achenial fruit (cypsela) of *Compositae* and *Dipsacaceae* :—" Aliae autem plantae sine siliqua, in simplici pellicula grani, nuda proferunt grana, in culmis infixa, sicut carduorum genera " (167, iii, 9) : " Post florem in ipsis fit semen eius, quod est granum, aliquantulum oblongum " (577, vi, 466) ; (4) achene of *Clematis Vitalba* (462, vi, 245) ; (5) nutlets of *Labiatae* (508, vi, 330) ; (6) fruit of *Tilia* (456, vi, 233) ; (7) pseudocarp of *Agrimonia Eupatoria* (482, vi, 283) ; (8) a relatively large seed, e.g. of *Leguminosae*, *Pyrus*, *Punica*, *Prunus*, *Paeonia*, *Cucumis*, *Vitis* (85, i, 177 ; 166, iii, 7 ; 171, iii, 17 ; 172, iii, 18 ; 552, vi, 414).

herba, herb with radical leaves :—" Herba autem infimum locum plantae retinere videtur, quae sunt id, quod ex una radice non profert nisi folia, sicut rapa porri et quaedam alia " (77, i, 156) : " Quaedam enim, quae videntur esse in genere herbarum, ad duas declinant extremitates, sicut olus, quod vocatur olus regis, hoc enim est et herba et olus, et similiter acelga, et multa alia, quae primo sunt herbae, et postea sunt olus, sicut sinapis et coriandrum et petrosilinum si usque ad secundum steterint annum, et multa alia " (78, i, 159) : " Quoniam quidem herba non statim producit stipites . . . . Deinde vero . . . exsurgit in stipitem, et tunc planta, quae vocatur herba, rationem accipit oleris " (295, v, 14).

herbalis, herbaceous (opp. to ligneous) :—" Caro lignea vel herbalis plantarum " (74, i, 149).

hortensis, cultivated in a garden or orchard (opp. to wild) :—" Ex ista autem foliorum et fructuum diversitate cognoscuntur masculae plantae a feminis tam in hortensibus quam in silvestribus plantis ; secundum proprietates competentes masculino et feminino " (100, i, 203).

hortensis sive *hortulanus ager*, kitchen-garden (643, vii, tract. 2, cap. ix).

hortus, garden in general, especially kitchen-garden (643, vii, 136).

iacinctinus, blue (in a wide sense) :—" Quinque [colores] communius in floribus videntur ; albus videlicet et croceus et rubeus et iacinctinus et purpureus " (160, ii, 141). -Used of the corollas of *Borago officinalis* (485, vi, 291) and *Cichorium Intybus* (504, vi, 321), and the perianths of *Iris germanica* (522, vi, 355) and *Orchis mascula* (571, vi, 454).

insitio, grafting (89, i, 183 ; 622, vii, cap. x).

lac (lit. milk), latex :—" Humor vero magnarum arborum . . . in quibusdam est, sicut lac, spissus et albus et viscosus et digestus dulcis, sicut in ficulneis " (69, i, 138) : " Ficus enim lac habet et esula, secundum omnes species suas, similiter autem et illud genus endiviae, quod vocatur rostrum porcinum et multa alia genera plantarum " (280, iv, 145).

lanugo (lit. woolly substance, down), (1) *lanugo* sive *capillaritas (arborum)*, epiphytic mosses, lichens and algae (298, v, 22) ; (2) plumose indumentum on the accrescent style of *Clematis* (462, vi, 245) ; (3) down-like tuft of stamens in cereal grasses and *Reseda Luteola* :—" Aliquando autem velut lanugo quaedam crocea dependet ex loco fructus, sicut in multis, quae sunt de genere granorum, sicut in frumento et siligine et huiusmodi " (154, ii, 128) : " In granis autem flos a loco formandi grani dependet quasi lanugo, exspirans de illa materia humoris, ex quo generari debet granum " (155, ii, 131) : " Flos autem eius est sicut lanugo quaedam tritici aut siliginis " (521, vi, 352) ; (4) down on the seeds of *Nerium Oleander* (423, vi, 165).

legumen, pulse, leguminous plant with edible seeds, e.g. *Cicer*, *Faba*, *Dolichos*, *Pisum*, *Lens*, *Vicia* (167, iii, 8 ; 470, vi, 299).

liber, outer bark of *Betula* :—" Cuius cortex exterior ex viscosa et lucida fit humiditate ; et ideo albus est, et liber proprie vocatur " (390, vi, 107).

ligna (pl.), woody cone-scales of *Pinus* (432, vi, 186).

linea, (lit. line) filament : —" Flos eius est citrinus, habens parvulas quasdam emissiones linearum, quae in superiori habent nodulos quosdam " (462, vi, 246).

linea lignea, woody central axis of cone of *Pinus* (432, vi, 186).

linea longa ex arbore egrediens, rhachis of the pinnate leaf of *Juglans* (414, vi, 147).

luxuriare, to grow rankly or luxuriantly (592, vii, 6).

malleolus (lit. small hammer), node :—" Nodos autem voco juncturarum colligatio, sicut sunt nodi in vitibus ; et hi nodi malleoli vocantur " (57, i, 113).

malum, apple, fruit of *Pyrus Malus* :—" Pomum autem ipsum, quod malum vocatur, constat ex quinque substantiis " (402, vi, 129).

malum granatum sive *punicum*, pomegranate, fruit and tree of *Punica Granatum* (90, i, 185).

masculinus, masculus, male :—" Et invenimus in plantis, quae dicuntur masculinae, quia omne quod generatur ex eis, est durius et asperius ; et quicquid generatur ex his, quae dicuntur feminae, est mollius et lenius. Et est magis fructifera femina, et grossiores habet fructus propter abundantiam humoris " (24, i, 41) : " Cognoscuntur masculae plantae a feminis tam in hortensibus quam in silvestribus plantis, secundum proprietates competentes masculino et feminino. Masculus enim propter siccitatem durior, et propter caliditatem ramosior . . . et fructus est brevior et rotundior quam feminae " (100, i, 203).

medulla, pith :—" Quaedam arbores habent nodos et venas et ventres et lignum et corticem et medullam interius " (57, i, 112) : " Cirpus est iuncus in locis palustribus crescens. . . . Est autem cortex eius valde viridis, et plenus medulla " (503, vi, 320).

morum, (1) fruit of *Morus*, mulberry ; (2) fruit of *Rubus*, blackberry (411, vi, 143).

murra, burr on tree-trunks :—" Tertius autem modus nodorum est nascentiae quaedam, quae ebulliunt extra in arboribus, et convertuntur in lignum totum reticulatum . . . et hic nodus vocatur latine murra " (60, i, 120).

nodulus (lit. little knob, nodule), (1) tuber of *Orchis mascula* (571, vi, 454) ; (2) anther of *Vitis vinifera* (462, vi, 246).

nodus (lit. a knot), (1) node :—" Nodos autem voco juncturarum colligationem, sicut sunt nodi in vitibus " (57, i, 113) : " Centinodia . . . crura habet composita ex infinitis nodis " (504, vi, 322) ; (2) knot in wood :—" Cum nutrimentum sit terrestre et grossum, ubique claudit sibi viam rectam per venas ligni, et ideo divertit ad alteram partem, et ibi conglobatur in nodum " (60, i, 119) ; (3) burr outside tree-trunk :—" Ebulliunt extra in arboribus, et convertuntur in lignum totum reticulatum . . . et hic nodus vocatur latine murra " (60, i, 120) ; (4) knot-like end of a petiole of a palmate leaf :—" Latine vocatur quinquefolia, eo quod quinque et quinque folia simul habet circa nodum unum " (555, vi, 421) ; (5) globose bur (capitulum) of *Arctium* (534, vi, 376); (6) subglobose capsule of *Linum usitatissimum* (563, vi, 435) ; (7) anther of *Lilium candidum* (530, vi, 370) ; (8) stigma of *Lilium candidum* (l.c.).

nucleatus, kernel-like :—" Grana nucleata in cypresso " (365, vi, 58).

nucleus (lit. kernel), (1) seed without its coat :—" Olea . . . enim habet corticem et carnem et testam durissimam et nucleum, qui est semen eius, qui et ipsa habet pellem extra in testa circa se in

qua involvitur " (64, i, 128) ; (2) seed with its coat :—" Distinguitur haec per quinque cameras, et in qualibet illarum formantur nuclei plures " (402, vi, 129) ; (3) soft nut, e.g. of *Castanea* and *Fagus* :—" Sunt in una theca multi nuclei tam in fago quam in castanea " (360, vi, 47).

nucum arbor, walnut tree, *Juglans regia* (74, i, 150).

nux (lit. a nut), (1) nut in general, i.e. a fruit with the kernel (*nucleus*) enclosed in a hard shell (*testa*) :—" Omnis fructus arboris, habens in se os, et in osse nucleum, vocatur nux, large sumendo " (416, vi, 153) : " Corilus enim, quae est arbor nota, habet nuces quae avellanae dicuntur " (415, vi, 150) ; (2) walnut (fruit of *Juglans regia*) :—" Nux ipsa ex quatuor componitur substantiis. Exterior enim quae est carnosa . . . est multum amara ; intra quam continetur testa. . . . Sub testa autem est pellis, in qua nucleus involvitur, et in ipsa nucleus quasi per quartas divisus" (414, vi, 148) ; (3) walnut-tree, *Juglans regia* :—" De nuce et aliis arboribus quae nuces habent " (414, vi, cap. xxvii.)

officialis, functional ; *officium*, function :—" Nodi enim et iuncturae et viae per modum venarum extensae et radices sicut membra officialia ad nutrimenti officium deservientia " (116, ii, 35).

olescere (of herbs), to become caulescent, to produce a branched stem :—" Quaedam autem habent partes ad invicem similes, sicut est beta et caulis, quamdiu est herba, antequam olescat sive in figuram oleris convertatur " (70, i, 139).

olus, *olus virens*, bushy herb :—" Est autem et aliud medium, sed multum ad herbae accedit proprietatem, quod vocatur olus virens ab auctoribus, quod quidem multos stipites projicit ex una radice, et in stipitibus ramos diversos, sed parum aut nihil ligneitatis, licet quaedam eorum durescant ad modum ligni in senectute longa. In quo genere sunt ruta et caulis et plura alia " (76, i, 155) : " Acelga [*Beta*] et multa alia, quae primum sunt herbae, et postea sunt olus " (78, i, 159).

os (lit. bone), hard part or " stone " of a fruit, e.g. (1) stone (endocarp) of a drupe :—" Fructus . . . quidam componuntur ex carne et osse et grano, sicut pruna secundum omne genus suum " (84, i, 177) ; (2) hard endosperm of *Phoenix dactylifera* :—" Quidam [fructus] ex carne et osse [componuntur] sicut dactili " (85, i, 177) : " Nucleus autem palmae, qui os dactilorum suorum vocatur, virtutem generandi et pullulandi habet quasi a dorso suo " (425, vi, 170).

palea, glume :—" Aliquid autem hinc simile patiuntur genera granorum, quae maturantur in paleis et quisquiliis palearum " (172, iii, 18).

palmes, long branch :—" Frutex est, quando palmites multi egrediuntur de radice una " (70, i, 139) : " Improprie tamen surculi etiam dicuntur palmites, qui pullulant a stipite et a ramis in diversis partibus plantae " (73, i, 146).

pampinus, leaf of the grape-vine :—" Est enim pampinus frequenter ex opposito racemi in vite " (72, i, 142) : " Hoc autem folium pampinus vocatur " (459, vi, 237).

panniculus (=*panicula*), cluster, lump :—" Semen eius [sc. violae] collectum est in panniculo sine distinctione et ordine " (575, vi, 464).

partes essentiales plantarum, permanent members of the plant body, i.e. the root and its branch roots, and the stem and its branches :—" Partes autem, quas dicemus et diximus, omnium sunt plantarum, quae crescentes sunt et auctae cum ipsis crescentibus et auctis : et istae sunt partes essentiales plantarum, et istae sunt radices et virgae et stipites plantarum et rami " (72, i, 143).

patulus, spreading :—" Fagus autem est arbor . . . procera multum et patula in ramis " (389, vi, 105).

pellicula (dim. of *pellis*), (1) seed-coat (179, iii, 36 ; 419, vi, 158) ; (2) thin pericarp of a cypsela :—" Aliae autem plantae sine siliqua, in simplici pellicula grani, nuda proferunt grana " (167, iii, 9) ; (3) layer of bast (253, iv, 84).

pellis (lit. skin, hide), (1) seed-coat (testa) :—" Ille [fructus olivae] enim habet corticem et carnem et testam durissimam et nucleum, qui est semen eius, qui et ipse habet pellem extra in testa circa se, in qua involvitur. . . . Nuces habent circa testam carnem quandam et testam et interiorem pellem, et amigdala similiter et persica et multa alia " (64, i, 128) : " Arilli [sc. semina *Vitis vinifera*] . . . pelle forti " (171, iii, 17) : " Nigra, autem non polita, est pellis sicut in faba nigra et papavere nigro et nucleis malorum et pirorum apud nos notorum " (179, vi, 37) ; (2) epicarp :—"Et tunc primo mollescere incipiunt huiusmodi fructus, et incipit subtiliari pellis eorum " (185, iii, 55) ; (3) layer of bast (574, vi, 462).

pendiculus (lit. a cord), peduncle, pedicel :—" Scyphus . . . nec per cotyledonem sive pendiculum aliquod coniungitur ramulo, sed immediate sedet super ipsum " (441, vi, 205) : " Quaelibet uva pendiculum habet, per quod racemo infigitur " (460, vi, 239).

pepansis (*fructuum*), maturation (of fruits) :—" Fructus completi sunt per pepansim " (142, ii, 100).

pepanus, mature :—" Fructuum autem pepanorum color ut in pluribus est croceus vel rubeus, et immaturorum color est viridis " (180, iii, 41) : " Omnium autem fructuum pepanorum proprium est cadere " (182, iii, 46).

pili (lit. hairs), the dried stigmas of the saffron crocus :—" Flos enim non habet folia nisi sicut pili vel fila stricta " (489, vi, 297).

pinguis, (1) (*sapor*), fatty, oily (taste) (195, iii, 78) ; (2) (*terra*) rich (soil) (417, vi, 156).

pistillum, pestle (532, vi, 374).

plantae adulterinae, weeds (604, vii, 35).

pomarium, orchard (649, vii, tract. 2, cap. iii).

pomulum (dim. of *pomum*), lit. little fruit, used for the fruit of *Buxus sempervirens* :—" [Buxi genis] quae magis exaltatur, minus

dilatatur in ramis, et profert pomula quaedam aculeata superius " (359, vi, 46).

pomum, fruit, used to denote both fleshy and woody " fruits," e.g. of *Pinus* (61, i, 122), *Musa* (347, vi, 19), *Pyrus, Citrus* (363, vi, 53, 54), *Cupressus* (365, vi, 57), *Rosa, Ficus* (366, vi, 59), *Cucumis* (378, vi, 81), *Cydonia* (381, vi, 89), *Punica* (397, vi, 118), *Rubus* (444, vi, 210).

ponticitas, astringency (283, iv, 155).

ponticus (*sapor*), raw, rough, harsh, astringent (taste) (195–199, iii, 79, 82, 85, 86 ; 460, vi, 239).

post fructum=infra fructum, below the fruit :—" Aliquando autem [situs florum] est post fructum subtus ita quod formatio fructus fit de medio floris, sicut in cinorum et prunorum floribus invenitur " (154, ii, 128).

pullulare, to sprout ; *pullulare ex semine*, to germinate (90, i, 186) :—" Os dactilorum . . . virtutem generandi et pullulandi habet quasi a dorso suo " (425, vi, 170).

pullulatio, (1) sprouting, sprout :—" Pullulationes surculorum in diversis locis corporum suorum " (61, i, 124) ; (2) *pullulatio ex semine*, germination :—" Invenitur autem triplex diversitas in pullulatione plantae ex ipso semine " (260, iv, 99) ; (3) sucker :—" Quando praescinduntur magnae arbores, et succus radicis non attrahitur in stipitis et ramorum cibum, statim plurimae pullulationes de radicibus nascuntur " (27, i, 48) ; (4) plumule :—" Omnes autem pullulationes semina, quae sunt acuta pyramidalem figuram habentia, emittunt ex parte acuta " (187, iii, 60).

pullus (lit. young animal, hence sprout), sucker :—" Arbores altissimae non generant pullos " (27, i, 48).

pulvis croceus (lit. yellow powder), pollen :—" Aliquando autem sicut pulvis croceus spargitur in loco formandi fructus, sicut in vite et paucis aliis fructibus " (154, ii, 128).

puniceus, purple :—" Daucus . . . habet florem album coronalem, in cuius medio est flos alius puniceus valde parvus " (506, vi, 328).

purgamentum, lit. excretion, used for the male catkin of *Juglans* (414, vi, 147), and *Corylus* (415, vi, 150).

purpureus, purple :—" Purpureus autem color . . . quasi mediat inter rubeum et nigrum, plus habens de rubeo, quam de nigro " (162, ii, 147).

quinarius, a set of five parts : (1) a whorl of five branches (341, vi, 3) ; (2) a pentamerous whorl of a flower :—" Borago herba . . . habet . . . florem iactinctinum, ut stellam dispositum in quo est compositio quinque quinariorum " (485, vi, 291).

quisquilia, chaff :—" Genera granorum quae maturantur in paleis et quisquiliis palearum " (172, iii, 18).

racemus, rhachis of a bunch of grapes :—" Racemus . . . super quod fundantur omnes uvae, quae sunt in botro " (459, vi, 239).

radix, (1) root or underground stem :—" Radix enim plantae est mediatrix organice inter plantam et cibum " (72, i, 144) : " Cepa est in colore porri et sapore, habens . . . radicem circularem grossam " (487, vi, 295) ; (2) base, insertion :—" Jujuber . . . spinam habet in sui folii radice " (364, vi, 55) ; (3) radish (*Raphanus sativus*) :—" Radix est speciale nomen herbae, cuius radix est valde magna, et ideo autonomastice radix vocatur " (556, vi, 423).

radix dentata, bulb of *Lilium* and corm of *Crocus* (488, vi, 297).

ramulus, branch of infructescence, e.g. of *Phoenix dactylifera* :—" In capsa simul profert ramulos et dactilos in ramulis illis " (428, vi, 177).

ramus, bough, main branch :—" Rami autem sunt partes illae quae immediate a stipite, non in loco surculorum, superius vero supra stipitem oriuntur. . . . Ramos autem habentium plantarum quaedam non sempiterne retinent eos, sed anno post annum renovant. . . . Tamen propriissime rami dicti non sunt nisi arborum, et non arbustorum vel fruticum vel olerum vel herbarum " (73, i, 147).

ramus folialis, rhachis of a pinnate leaf :—" Fraxinus . . . multa folia producit ex uno stipite vel ramo foliali " (391, vi, 108).

ramusculus, (1) branchlet :—" Haec folia sunt ramusculis et folia et cortex " (365, vi, 56) : " Fibex . . . est autem arbor sterilis . . . multorum minutissimorum ramusculorum in ea dependentium" (390, vi, 107) ; (2) young branch or leading shoot (341, vi, 3).

respergere, to sprinkle :—" Dum enim formatur flos, id, quod habet terrestre, cum pingue facile inflammabili rejicitur, et ad modum farinae respergitur super interiora floris " (150, ii, 122).

respersio (lit. sprinkling), pollen :—" In campestri rosa non inveniuntur nisi quinque folia. In medio autem est respersio crocea, stans in culmo uno simul " (445, vi, 213).

reticulatio, reticulation, network of veins in a leaf :—" Venae autem, quae sunt in foliis, et reticulatio causantur ex terrestri sicco " (143, ii, 105).

rubeus, red in a general sense (160, ii, 141), including : pink, e.g. the flower of *Centaurium umbellatum* (499, vi, 311) ; pale purple, e.g. *Fumaria officinalis* (518, vi, 347) ; purple, e.g. *Agrostemma Githago* (543, vi, 376).

rubicundus, deep red, e.g. the flower of the common peony (552, vi, 414).

rubus, (1) bush with long flexible branches :—" Sed medium inter haec [frutices] habet nomen proprium apud nos, et vocamus ipsum rubum, et hoc est, quod longitudinem magnam habet in ramis, et minorem ligneitatem quam frutex " (76, i, 154) ; (2) bramble, *Rubus fruticosus* :—" Rubum vocamus vepres, quae mora dulcia habent, et repunt super plantas alias sibi vicinas " (411, vi, 143).

rufus, scarlet, applied to the petals of *Papaver Rhoeas* (160, ii, 141), and the berries of *Arum maculatum* (485, vi, 290).

salsus (*sapor*), salty (taste) (194, iii, 76).

sarmentum, slender shoot (656, vii, 172).

scabiosus, rough, scabby :—" Scyphus autem, in quo sedet glans ipsa, . . . exterius est scabiosus, habens superficiem asperam " (441, vi, 205).

scabrosus, rough, scabrous, e.g. the bark of *Ulmus* :—" Ulmus autem est arbor magnae quantitatis, habens asperum corticem et scabrosum, quando antiqua fuerit " (467, vi, 256).

sceptrum, scion, graft (307, v, 43 ; 312, v, 54).

scyphulus (lit. little cup), (1) cupule of an acorn (440, vi, 204) ; (2) operculum of circumscissile capsule of *Hyoscyamus* (526, vi, 362).

scyphus (lit. cup), cupule of an acorn :—" Scyphus autem, in quo sedet glans ipsa, est concavus, bene formatus, quasi esset tornatilis intus ; cuius fundus est aliquantulum planus, in quo glans sedens suxit nutrimentum ; et exterius est scabiosus habens superficiem asperam " (441, vi, 205).

sedere (lit. to sit), to be sessile :—" Scyphus . . . nec per cotyledonem sive pendiculum aliquod coniungitur ramulo, sed immediate sedet super ipsum " (441, vi, 205).

sedes (lit. seat), place of insertion :—" Grana ordei arefacta sede de facili decidunt " (640, vii, 128) : " Sedes floris " (403, vi, 129).

semen, (1) seed, collectively (543, vi, 396) ; (2) an individual seed (166, iii, 7) ; (3) seed-like fruit, e.g. of *Compositae* and *Umbelliferae* (167, iii, 9 ; 495, vi, 306) ; (4) fruit of *Cassia Fistula* :—" Fructus autem, qui sunt semina quaedam longa, producit, quorum capsa succedente tempore prolongatur, postea autem indurantur semina, cortice forinsecus exsiccato . . . Crescunt autem in una capsa plus quam quadraginta semina simul " (375, vi, 75).

semper virens, evergreen :—" Edera est arbor nota et communis, semper virens " (385, vi, 97).

siliqua, (1) spathe of *Phoenix dactylifera* (427, vi, 175), of *Arum maculatum* (485, vi, 290), of *Allium* and *Umbelliferae* (167, iii, 9) ; (2) glumes of an ear of corn :—" [Frumentum] grana autem sua profert in spica, quae est multarum siliquarum, ita quod quodlibet granum eius est in pluribus siliquis " (519, vi, 349) ; (3) calyx :—" In folliculis autem et siliquis flores formantur propter teneritudinem ipsorum ; aliter enim frequenter laederentur frigore " (151, ii, 124) : " In mespilo . . . siliqua floris remanet in anteriori pomi maturi " (447, vi, 215) : " Nigella est herba . . . rubeo flore quae exit de siliqua viridi " (543, vi, 396) ; (4) a dry dehiscent seed vessel :—" Quae [semina] autem nullam habent circumpositam sibi carnem, sed in siliquis complentur, sunt, quae interiori et maturo abundant primo humido " (171, iii, 18) : e.g. the capsule of *Papaver* (149, ii, 117), the capsule of *Reseda* (521, vi, 352), the legume of *Leguminosae* (167, iii, 8) :—" Hoc autem cooperculum [seminum] in quibusdam est vocatum siliqua, sicut in pisa et faba " (85, i, 177) ; (5) pericarp in general (166, iii, 6) ; (6) pericarp of a nut, e.g. *Quercus* (440, vi, 204) ; (7) core of an apple or pear :—" Quoniam quaedam extra siliquam in qua sunt semina, habent carnem sicut poma omnia, quae mala dicuntur vel pira " (166, iii, 7).

silvestris, (1) wild :—" Quoniam plantarum quaedam est domestica, quae cultu nutritur adhibito ; quaedam autem cum hoc hortensis vult esse, quae defendi vult a communi frequentatione animalium ; et quaedam est silvestris, omnino sine cultu et protectione germinans " (79, i, 163) ; (2) abaxial, distal (364, vi, 55), or exterior (429, vi, 179).

spathula, *spatula*, spathe of *Phoenix dactylifera* (93, i, 189 ; 428, vi, 179).

spica, (1) spike, ear of corn, e.g. of wheat, barley and rye (519, vi, 349 ; 544, vi, 399 ; 640, vii, 128), infructescence of *Panicum* and *Setaria* (523, vi, 357) ; (2) spike-like inflorescence of *Lavandula Stoechas* (562, vi, 433) ; (3) bulb of *Allium*, in allusion to its spike-like sprout (482, vi, 284) ; (4) stamen of *Clematis Vitalba* :—" Post casum quarundam spicarum floris vitis albae, quae circumstat pullulationem lanuginis, tunc expanditur lanugo " (462, vi, 245).

spina, (1) spine ; (2) woody prickle (emergence) :—Inveniuntur autem duo genera spinarum in plantis. Sunt enim spinae, quae ex profundo plantae educuntur ; et hae quidem rectae et longae sunt propter calorem materie. Sunt etiam quaedam spinae, quarum basis non profundatur in corpus plantae sed stat super corticem, quasi extrinsecus adhaerens plantae ; et sunt istae spinae breves, recurvae anterius, et peracutae, sicut sunt spinae tribulorum et bedegar et rosariorum et ramni et aliarum multarum " (266, iv, 114) ; (3) prickly bush or shrub, e.g. *Rosa canina* (358, vi, 43).

spinetum, spiny bush :—" Vocamus enim frutices ea, quae multos ex una radice ramos emittunt, cum tamen sint lignei rami, sicut sunt spineta quaedam " (76, i, 154).

spissitudo, thickness, e.g. of leaves :—" Spissitudo autem et tenuitas foliorum, similiter autem et latitudo et strictura eorundem in plantis invenitur " (146, ii, 110).

spissus, thick :—" [*Viscum album*] habet folia spissa, in hieme retinentia virorem, et sunt fere sicut folia olivae, nisi quod in colore declinant aliquantulum ad croceitatem citrinam " (253, iv, 84).

stipes, (1) erect main stem of a tree or other plant, or one of several main stems from a root :—" Stipes autem plantae est, quae sola a terra nascitur, a radice quasi perpendiculariter ad rectos angulos erecta, est sicut statura erectionis plantae " (72, i, 145) : "Arbor enim est, quae habet ex sua radice stipitem fortem " (75, i, 153) : " Olus virens . . . quod quidem multos stipites projicit ex una radice (76, i, 155) ; (2) rhachis of a leaf, e.g. of *Achillea Ptarmica* (550, vi, 411) ; (3) petiole (484, vi, 289).

stipula, stalk, culm, stubble :—Hoc invenitur . . . praecipue in his, quarum herba concava est, sicut stipula " (113, ii, 26) : " Cum autem grana, quae dicta sunt, messa fuerint, generaliter dicitur de omnibus esse compertum, quod in stipulis suis diutius conservantur quam expressa " (642, vii, 135).

strictura, narrowness, e.g. of leaves :—" Strictura autem foliorum ex siccitate et viscositate calidi humoris generaliter fit " (147, ii, 112).

strictus, lit. drawn out, hence narrow :—" Salix [*Salix alba*] . . . folium habet longum et strictum, latius quam sit folium amigdali " (449, vi, 218) : " Et folia illa sunt frequenter lata superius, et strictiora inferius, sicut caulis et blitus et plantago et huiusmodi " (146, ii, 109) : " Quarundam autem [folia] sunt stricta valde, sicut juniperi et abietis " (82, i, 168).

stypticus (*sapor*), harsh, sour, rough and somewhat astringent (taste) (199, iii, 87).

superfluitas, excretion, used for the male catkin (amentum) of *Alnus*, *Juglans* and *Corylus* (351, vi, 28).

surculus, sucker :—" Surculi vero proprie sunt virgae e radice arboris circa stipitem pullulantes " (73, i, 146).

tela, lit. web, (1) pericarp of a cereal grain (85, i, 177) ; (2) seed-coat (testa) :—" In nucibus magnis est casta et testa et tela circa nucleum " (85, i, 177) : " Testa eius [sc. nucis indicae] est nigra, et nucleus eius est involutus in tela sicut et nuclei aliarum nucum" (416, vi, 152).

tenuitas, thinness, e.g. of leaves (146, ii, 110).

tenuis, thin :—" Folia autem ipsius [sc. *Fagi sylvaticae*] sunt tenuia " (390, vi, 105).

terrestreitas, solidity (vide seq.).

terrestris (class. terrestrial), lit. earthy, hence solid :—" Linea autem illa est viridis, durior et terrestrior quam folia, et minus habens terrestreitatis quam ramusculus " (414, vi, 147) : " Nux autem ipsa ex quatuor componitur substantiis. Exterior enim, quae est carnosa, et non dura multum terrestris, est multum amara ; intra quam continetur testa, quae magis est terrestris et minus aquea quam exterior " (414, vi, 148).

testa (lit. brick, tile, hence earthenware pot, shell, skull), (1) hard pericarp of a nut, e.g. *Corylus Avellana* (85, i, 177) ; (2) hard pericarp of a capsule, e.g. *Agrostemma Githago* (543, vi, 396) ; (3) endocarp of a drupe, e.g. *Olea europaea* (64, i, 128), *Juglans regia* (414, vi, 148), *Cocos nucifera* (416, vi, 152), *Amygdalus*, *Prunus* (438, vi, 200, 201) ; (4) seed-coat, e.g. *Cupressus sempervirens* (365, vi, 58).

testeus (lit. having the consistency of earthenware), hard and shell-like, e.g. the stone (endocarp) of *Prunus* and *Cerasus* (166, iii, 7), and the capsule of *Agrostemma Githago* :—" Testeum est illud vas seminis . . . et est valde frangibile et tenue " (543, vi, 396).

theca (lit. envelope, cover, case, sheath), applied to : (1) involucre of *Castanea* :—" Fructum autem suum habet in hispida and hirsuta et spinosa theca, sicut et fagus " (360, vi, 47) ; involucre of *Tragopogon* (547, vi, 404) ; (2) calyx of *Borago* (485, vi, 291) ; (3) capsule of *Hyoscyamus niger* (526, vi, 362) ; of *Agrostemma Githago* (543, vi, 396) ; (4) follicle of *Paeonia* (552, vi, 414) ; (5) core (pericarp) of the pear, *Pyrus communis* (434, vi, 191) ; (6) pericarp of *Fraxinus* (391, vi, 108) ; (7) pseudocarp of *Rosa* (543, vi, 396) ; (8) wall of incomplete loculus of the capsule of *Papaver* :—

" In capite autem suo habet thecas ordinatas multas per circuitum " (554, vi, 419).

thyrsus, relatively slender straight stem, e.g. of *Nerium Oleander* (423, vi, 165).

tunica (lit. tunic, undergarment), (1) layer of tissue :—" Crescit planta quasi per quasdam tunicas herbales vel ligneas " (121, ii, 49) ; (2) bulb-scale of *Allium* (487, vi, 295).

tunica lignea, annual ring of wood :—" Crescit autem substantia eius per circuitum a radice rursum ex tunicis ligneis " (361, vi, 49).

unctuosus (*sapor*), oily, fatty (taste) (195, iii, 78).

uva, grape (74, i, 150 ; 459, vi, 239).

uva lupi, *uva lupina* (lit. wolf grape), *Solanum nigrum* : " Solatrum est herba nota, habens folia multa viridia, et habet semen, ac si esset uva, propter quod etiam a quibusdam uva lupi vocatur " (567, vi, 442) : " Silvestris autem et montana [vitis] habet ramos valde longos similes ramis vitis domesticae, sed folia habet sicut uva lupina, quam nos solatrum vocamus " (463, vi, 248).

vas seminis, *vas seminum*, lit. vessel containing the seeds : (1) fleshy receptacle of fruit of *Rosa* (543, vi, 396) ; (2) capsule of *Agrostemma* (543, vi, 396) ; (3) *duo vasa*, the two layers of a drupe, flesh and stone, e.g. in *Prunus* (170, iii, 14).

vena (lit. vein), (1) vascular bundle :—" [Venae] sunt viae rectae, in quibus decurrit nutrimentum " (58, i, 144) : " Veniunt etiam viae istae aliquando a radice ascendentes, aliquando autem ex medulla ad exteriora plantae " (122, ii, 49) ; (2) esp. vein of the leaf :—" In medio autem dorso folii, ubi est vena nutrimenti folii, est vena citrina declinans ad albedinem " (521, vi, 352).

vepres, thornbush, prickly bush (384, vi, 93 ; 411, vi, 143).

via venalis, vascular bundle :—" Hoc . . . cognoscitur in urtica maiore et canabo et lino et linaria, et in multis aliis plantis, quae vias venales habent multum fortes et viscosas et directas " (125, ii, 59).

violaceus, made from violets, e.g. *oleum violaceum* (548, vi, 405).

virens hieme et aestate, evergreen (359, vi, 45).

virga, (1) slender branch, whether of the stem or root (61, i, 124) ; (2) rhachis of inflorescence of *Agrimonia Eupatoria* (482, vi, 283), and *Reseda Luteola* (521, vi, 352).

virgula (dim. of *virga*), lit. little rod : (1) stamen :—"Ad intrinsecus floris [*Boraginis officinalis*] sunt quinque virgulae iacinctinae longae et rectae " (485, vi, 291) : " Circa eam [sc. stylum *Lilii candidi*] stant breviores quaedam et debiliores virgulae, omnes habentes croceos nodos molles " (530, vi, 370) ; (2) style :—" In medio illarum [sc. staminum] est una virgula longior illis, et illae sunt spicae floris " (485, vi, 291) : " Flos . . . in medio profert virgulam longam, quae habet nodum sicut clavus aut terminus (530, vi, 370).

virgula parvula, (1) rhachis of an inflorescence, e.g. of *Vitis* (74, i, 150) ; (2) rhachis of a pinnate leaf, e.g. of *Juglans* (l.c.).

viridarium, pleasure-garden, consisting of a lawn surrounded by a border of flowers and aromatic herbs, with a certain number of trees for shade (636, vii, cap. xiv).

zizania, (1) lit. darnel (583, vi, 479); (2) a weed of any crop (554, vi, 420; et l.c.).

LVI—NOTES ON THE FLORA OF SOUTHERN AFRICA : IV.* Miscellaneous New Species. R. A. Dyer.

Fockea gracilis *R. A. Dyer*, sp. nov. [Asclepiadaceae]; affinis *F. sinuatae* (E. Mey.) Druce, a qua caulibus superne tortuosis, marginibus foliorum minus undulato-sinuatis, coronae tubo lobis longiore differt.

Herba perennis, radice tuberosa. *Tuber* plus minusve oblongum, 15–20 cm. crassum, radicibus paucis tenuibus instructum; caudex perennis, subterraneus, sparse ramosus, usque ad 20 cm. longus, circiter 1 cm. crassus, succulentus vel sublignosus. *Caules* annui, graciles, superne tortuosi, 15–30 cm. longi, leviter carnosi, minute puberuli. *Folia* sessilia, linearia, 2–3 cm. longa, 1–2 mm. lata, supra minute puberula, infra glabra, apice incurvata, acuta, marginibus undulato-sinuatis reflexis vel revolutis. *Flores* axillares, 2–6-ni, in racemis brevissimis dispositi vel fasciculati; pedicelli 1–2·5 mm. longi, puberuli. *Calycis* segmenta anguste oblongo-lanceolata vel lineari-oblonga, 2 mm. longa. *Corolla* campanulata, extra puberula; tubus 3–3·5 mm. longus; lobi lineares, 6–7 mm. longi, 1 mm. lati, obtusi, intus glabri vel sparse et minutissime puberuli, viridi-fusci. *Corona* tubulosa, .5 mm. longa, basi cum tubo corollae 1 mm. conjuncta, eo paullum exserto; tubus 3·5 mm. longus, intra appendicibus 5 subulatis instructus; lobi 5, tridentati, 1·5 mm. longi. *Antherae* breves, erectae, membrana maxima elliptica hyalina terminatae.

Eastern Cape Province: Albany Division; amongst short Karroo bushes on Dikkop Flats, 22 miles from Grahamstown, rare, March, *Dyer* 1251 (type).

Fockea cylindrica *R. A. Dyer*, sp. nov. [Ascelepiadaceae]; affinis *F. eduli* (Thunb.) K. Schum. et *F. crispae* (Jacq.) K. Schum., ab illa foliis supra paullum glaucis, corollae segmentis linearibus 7–8 mm. longis, coronae tubo quam corollae tubo breviore, ab hac foliis glabris et paullum glaucis, ab ambabus corollae tubo cylindrico 4 mm. longo differt.

Herba perennis, radice tuberosa magna. *Caules* perennes, sublignosi, sparse ramosi; rami annui graciles, herbacei, minutissime puberuli, usque ad 25 cm. longi vel verisimiliter longiores. *Folia* opposita, brevissime petiolata, ovata vel oblongo- vel elliptico-ovata, acuta vel acute apiculata, 1·6–2 cm. longa, 0·8–1 cm. lata, glabra, supra paullum glauca, marginibus plus minusve undulatis. *Flores* 2–4-ni, in fasciculis axillaribus dispositi; pedicelli 2 mm. longi,

*Continued from *K.B.* 1932, 512.

puberuli. *Calycis* segmenta lanceolata, 2–2·5 mm. longa. *Corolla* extra dense puberula, lobis intus glabris vel faucem versus puberulis ; tubus cylindricus, 4 mm. longus ; lobi lineares, 7–8 mm. longi, in alabastro valde, flore aperto minus tortis, marginibus revoluto-plicatis. *Corona* tubulosa, tubo ejus corollae tubo breviore basi circiter 1 mm. cum hoc conjuncta, intra appendicibus 5 filiformibus instructo ; lobi 5, tridentati, 3 mm. longi, dentibus 5 parvis alternis. *Antherae* breves, erectae, membrana maxima elliptica hyalina terminatae.

Eastern Cape Province : Albany Division ; amongst karroid scrub on dry flats, near Committees in the Fish River Valley, 20 miles from Grahamstown, rare, Aug., *Dyer* 1635 (type).

The above two rarities will be figured in Hooker's Icones Plantarum during this year. It seems to be generally the case that species of *Fockea* are represented by comparatively few individuals, although not always restricted to a small area. The fact that the tubers of certain species are edible and are utilised by both man and animals may account for this to a considerable extent.

The two species to which *F. cylindrica* is most nearly allied, namely *Fockea edulis* (Thunb.) K. Schum. and *F. crispa* (Jacq.) K. Schum., are under the names *F. glabra* Decne. and *F. capensis* Endl. respectively in Dyer, Fl. Cap. **4,** sect. 1, 779–780. The former two specific epithets take priority according to the International Rules.

Hibiscus aridus *R. A. Dyer*, sp. nov. [Malvaceae] ; affinis *H. pedunculari* Linn. f., a quo foliis late ovatis vel orbiculato-ovatis superne stellato-scabridis, floribus luteis, seminibus pilis longis lanatis differt.

Suffrutex 20–60 cm. altus, ramis rectis tenuibus, indumento patente stellato-scabrido et pilis paucis simplicibus indutis. *Folia* late ovata vel orbiculato-ovata, obtusa, basi truncata vel cordata, 2–5 cm. longa, 1·5–4 cm. lata, marginibus crasse dentatis, utrinque pilis 4–7-radiatis scabrida; petioli 1–2 cm. longi, basi stipulis 2 instructi ; stipulae 5–8 mm. longae, subulatae. *Flores* solitarii, axillares ; pedicelli usque ad 10 cm. longi, plerumque foliis multo longiores, infra calycem circiter 0·5–1 cm. articulati. *Epicalyx* 6–8-lobatus, lobis linearibus acuminatis vel acutis 1·3–1·8 cm. longis, pilis stellatis et etiam interdum paucis simplicibus instructis. *Calycis* tubus 2–3 mm. longus ; lobi lineari-lanceolati, 1·2–1·7 cm. longi, stellato-scabridi. *Corolla* plus minusve 7 cm. expansa, lutea, glabra ; petala obovata, basi cuneata, apice rotundata. *Columna* staminea 7–8 mm. longa. *Stylus* 5-ramosus, ramis 3–4 mm. longis teretibus, stigmatibus capitatis hispidis. *Capsula* globosa, 10–15 mm. diametro, glabra, in loculis seminibus 3–5 subtriangulatis pilis longis lanatis.

Eastern Cape Province : Albany Division ; between Pluto's Vale and Committees, in the Fish River valley karroid scrub, Jan., *Dyer* 1829 (type) ; near " Lifford " farm, Dec., *Britten* 5545 ; Alicedale, *Cruden* 133. Bathurst Division ; Port Alfred, May,

Rogers, without no. Uitenhage Division; hills near Uitenhage, Dec., *Prior*, without no.

The type specimen has no ripe capsules, and the characters given in the above description were taken from *Britten* 5545. *H. aridus* is evidently a comparatively rare endemic species limited to the dry karroid scrub from Uitenhage to Albany and Bathurst Divisions. It is distinguished by its large dark yellow flowers on long peduncles, ovate or ovate-orbicular leaves, stellate-hispid on both surfaces, and lanate seeds.

Sebaea cleistantha *R. A. Dyer*, sp. nov. [Gentianaceae]; affinis *S. acutilobae* Schinz, a qua habitu robustiore, inflorescentia multo densiore, floribus majoribus cleistogamis, stigmate stylo duplo longiore differt.

Herba annua, erecta, 5–25 cm. alta. *Caulis* infra simplex, superne ramosus, costatus. *Folia* glabra, opposita, late ovata vel suborbiculata, 5–12 mm. longa, 5–10 mm. lata, obtusa, inferiora plus minusve conferta, superiora distantia, paribus 3–6. *Flores* in cymis dense ramosis vel leviter subramosis corymbiferis dispositi. *Calyx* 3–4 mm. longus, segmentis anguste lanceolatis vel ellipticis acuminatis carinatis vel alatis; alae medio latissimae, circiter 0·5–1 mm. latae vel juniores angustiores. *Corolla* 5–7 mm. longa; tubus 3–4·5 mm. longus; lobi 2–2·5 mm. longi, 1·5–2 mm. lati, late ovati, obtusi. *Filamenta* brevissima, basi sinuum corollae inserta; antherae 0·75–1 mm. longae, apice glandula instructae. *Stylus* 0·5 mm. longus, stigmate et glandulis confluentibus 1 mm. longis. *Fructus* ovato-oblongus, 2·5–3 mm. longus.

Eastern Cape Province: Port Elizabeth Division; Walmer, Sept., *Paterson* 770a. Bathurst Division; Port Alfred, Oct., *Paterson* 7; Kowie, on margin of dry pan, common in a small area only, alt. 20 ft., Oct., *Dyer* 629 (type).

Although the type specimen was collected during bright sunshine, the corolla-lobes of flowers in all stages of maturity remained twisted and closed as in the bud stage; nor are there open flowers on either of the other two herbarium specimens quoted, a character not observed in any other species.

Thesium congestum *R. A. Dyer*, sp. nov. [Santalaceae]; affine *T. folioso* A.DC., foliis densioribus et brevioribus superne recurvatis, disco distincto, floribus solitariis in axillis bractearum in racemis spiciformibus densis dispositis, perianthii segmentis nec papillosis nec profunde cucullatis differt.

Suffrutex usque ad 45 cm. altus, lignosus, multo ramosus, glaber; rami 2–2·5 mm. diametro, foliorum basibus decurrentibus costati. *Folia* sessilia, dense imbricata, anguste lineari-lanceolata, 6–8 mm. longa, 1–1·5 mm. lata, supra plana, infra leviter carinata, basi decurrentia, superne recurvata, luteo-viridia, margine minutissime scabrido vel laevigato. *Flores* solitarii in axillis bractearum in racemis spiciformibus densis dispositi. *Bracteae* anguste lanceolatae, 3–3·5 mm. longae, supra concavae, superne recurvatae,

floribus longiores, margine minutissime scabrido vel laevigato ; bracteolae bracteis angustiores et breviores, floribus longiores, superne recurvatae. *Perianthium* circiter 1·5 mm. longum ; segmenta triangulari-ovata, haud papillosa, haud vel leviter cucullata, 1 mm. diametro. *Filamenta* brevissima ; antherae e perianthii tubo exsertae, 0·25 mm. longae. *Discus* distinctus, circiter 1 mm. diametro. *Stylus* 0·5 mm. longus. *Fructus* subsessilis, globosus, 2 mm. crassus, costatus, perianthio diu persistente.

Eastern Cape Province : Stockenstrom Division ; Katberg, near " The Gorge," 6500 ft., Nov., *Dyer* 741 (type) ; Victoria East Division ; Hogsback, Dec., *Rattray* 54.

LVII—MISCELLANEOUS NOTES.

Retirement of Mr. Skan.—Mr. Sidney Alfred Skan retired from the post of Botanist in the Herbarium on September 30th, 1933.

Mr. Skan entered Kew as a Student Gardener on September 19th, 1892, and was promoted to be an Assistant (later Botanist) in the Herbarium on July 16th, 1894. His interest in books early marked him out to assist in the Library and gradually he took on the duties of Librarian, a " post " which he held until his retirement this year. Mr. Skan's unique knowledge of botanical literature has been of the greatest value in the Herbarium, and his proverbial readiness to help enquirers rendered this knowledge available to all. In addition his wide knowledge of plants has always been of great assistance to his colleagues. His systematic work included an account of the difficult family *Scrophulariaceae* for the " Flora of Tropical Africa " (with W. B. Hemsley), the *Salicaceae* and part of *Labiatae* for the " Flora Capensis," and most of the *Cupuliferae* for the " Index Florae Sinensis."

We wish Mr. and Mrs. Skan many happy years of retirement.

Dr. T. A. Sprague, Deputy Keeper of the Herbarium and Library, is now in charge of the work of the Library, with Mr. E. Nelmes, Assistant Botanist, as his assistant.

Miss Winsome Barker.—We learn with pleasure that Miss Barker has received an appointment on the staff of the National Botanic Gardens, Kirstenbosch, South Africa. Miss Barker had been employed by Kew at the Bolus Herbarium, with the aid of a grant from the Bentham-Moxon Trust Fund, from Feb. 1st, 1931, until July 31st, 1933, during which period she made very valuable additions to our collections of living and dried South African plants. She has worked especially on the Monocotyledons, *Mesembryanthemum*, and other groups, and her skill in preparing dried specimens and in botanical drawing has proved of great value to Kew.

Charles Carmichael Lacaita.—By the death of Mr. C. C. Lacaita on July 17th, Kew has lost an old and valued correspondent and a frequent and welcome visitor to the Herbarium. Lacaita

collected widely in France, Spain, Greece, Italy, Switzerland and elsewhere and made many important contributions to the study of the European flora. His attention was often directed to critical matters of nomenclature with regard to European plants and he was able to clear up several uncertain points and settle the status of doubtful species. Many of his critical researches are published in his best known series of papers, issued under the title "Piante Italiane critiche o rare," in Nuov. Giorn. Bot. 1910–1927. In 1913 he visited Sikkim and published an account of his collections in Journ. Linn. Soc. Bot. **43,** 457 (1916). He published, in Journ. Bot. **67,** 107 (1929), Gay's descriptions of Durieu's Asturian plants, abstracted from the Gay manuscripts at Kew. In the "Kew Bulletin" 1919, 321, a lengthy and learned article on the Jerusalem Artichoke appeared from his pen. His herbarium collections have been presented or bequeathed to the British Museum (Natural History).

Dr. M. O. Malte.—The death on August 4th, at the age of 53, of Dr. M. O. Malte, Chief Botanist, National Museum of Canada, is a great loss to Canadian botany. Dr. Malte, who was a native of Sweden, had acted for thirty years as Research Botanist of the Federal Government. In this capacity his work was largely of an economic character, but he had an extensive knowledge of the flora of Canada and Arctic North America, and had specialized on the family *Gramineae*. As a member of the Canadian Arctic Expedition, 1927, he visited Greenland and the principal islands in the eastern part of the Canadian Arctic Archipelago, obtaining about 4000 sheets of specimens during 77 hours of actual collecting.

He took a wide interest in general botanical problems and attended the International Botanical Congresses at Ithaca (1926) and Cambridge (1930) as an official delegate.

Among recent papers by Dr. Malte are "Commercial Bent Grasses (Agrostis) in Canada" (Ann. Rep. Nat. Mus. Canada, 1926, 105–126 : 1928), and "The so-called Agropyron caninum of North America" (l.c. 1930, 25–27 : 1932).

The Medicinal and Poisonous Plants of Southern Africa.*—This book should be of special interest, not only to botanists, but to workers in other spheres who are in any way connected with Southern Africa and its flora. Although there are several well-known works relating to the systematic botany of Southern Africa, detailed works on the economic uses of indigenous plants are lamentably few and far between. This renders the appearance of the present work all the more gratifying.

The literature relating to both medicinal and poisonous plants in South Africa is very scattered. Many of the older papers have long

*By J. Mitchell Watt and M. G. Breyer-Brandwijk. E. & S. Livingstone, 16–17, Teviot Place, Edinburgh, 1932. Pp. cxxviii + 314, illustrations 32. Price 25*s.* net.

been out of print and existing copies are difficult of access to most workers. Consequently the need of a good reference book, incorporating both the old and the new, has long been felt. The new volume should completely fill this gap, for the amount of information contained therein, derived from most varied sources, is remarkable. The authors have made a diligent search and apparently nothing of any consequence has escaped their attention. In addition to the results and observations of other workers the researches of the authors themselves, carried out in the Pharmacology Department of the University of the Witwatersrand, are incorporated and supply much that is interesting and new concerning the properties of native medicinal plants.

The arrangement of the subject matter in the volume is excellent. The species appear under their respective families and these are arranged according to the system of Harms, which is the system adopted in other important South African botanical works. In the list of contents with which the volume opens the important properties of the more outstanding species are indicated. Detailed indexes are incorporated, consisting of separate indexes of English, Afrikaans, and native names, and of active principles. These are a valuable feature, particularly in view of the wide scope of the book ; and the space they occupy, eighty-eight pages out of a total of three hundred and fourteen, is not to be grudged. Full references to literature are given at the end of each family. In addition an appendix at the end of the volume contains a list of the larger and more general works consulted. Several photographs and coloured illustrations are included, many of which are reproduced from the useful South African Government publications relating to poisonous plants, particularly those concerned with the poisoning of live-stock.

A feature of the book which should render it of use in countries other than South Africa is the fact that many of the species dealt with occur commonly in other parts of the world. Some of the better known of these are :—*Abrus precatorius* L., *Agave americana* L., *Argemone mexicana* L., *Anacardium occidentale* L., *Cannabis sativa* L., *Carica Papaya* L., *Entada scandens* Bth., *Jatropha curcas* L., *Melia azedarach* L., and species of *Acacia, Datura, Eucalyptus, Euphorbia, Gloriosa, Solanum, Tephrosia* and *Xanthium.*

In view of the large amount of work that has been, and is being, carried out in South Africa on poisonous plants, particularly in the veterinary field, the appearance of a work of this sort is very appropriate. In the preface the authors state their aim has been " to give all the available information on the medicinal uses, chemical composition, pharmacological effects, and human and veterinary toxicology of the flora of Southern Africa." They are to be congratulated in having so successfully accomplished their difficult task.

F. N. H.

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